DEVOTED TO
TEXTILE CHEMISTRY
AND
WET-PROCESSING
BLEACHING
DYEING
PRINTING
FINISHING

JANUARY 24, 1949
VOLUME 38, No. 2

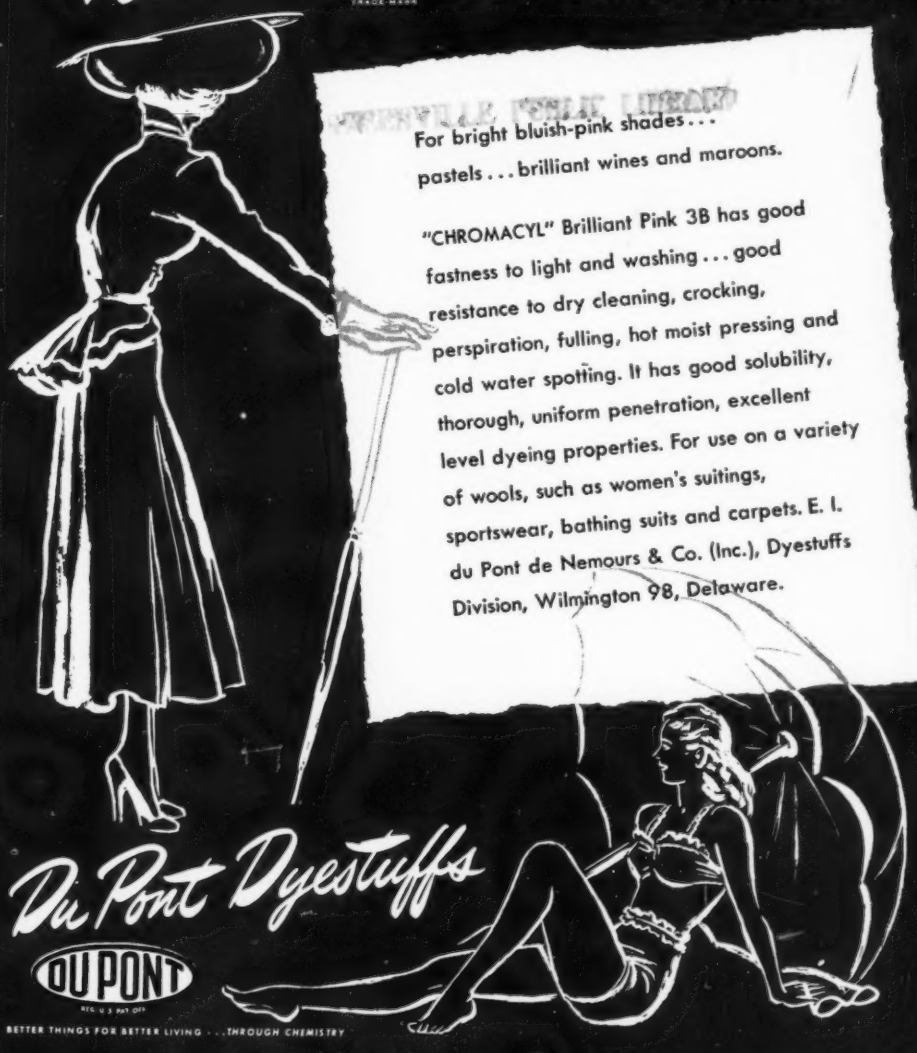
AMERICAN DYESTUFF REPORTER

INCORPORATING TEXTILE COLORIST AND CONVERTER

New CHROMACYL Brilliant Pink 3B
TRADE-MARK

For bright bluish-pink shades... pastels... brilliant wines and maroons.

"CHROMACYL" Brilliant Pink 3B has good fastness to light and washing... good resistance to dry cleaning, crocking, perspiration, fulling, hot moist pressing and cold water spotting. It has good solubility, thorough, uniform penetration, excellent level dyeing properties. For use on a variety of wools, such as women's suitings, sportswear, bathing suits and carpets. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.



Du Pont Dyestuffs
DUPONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
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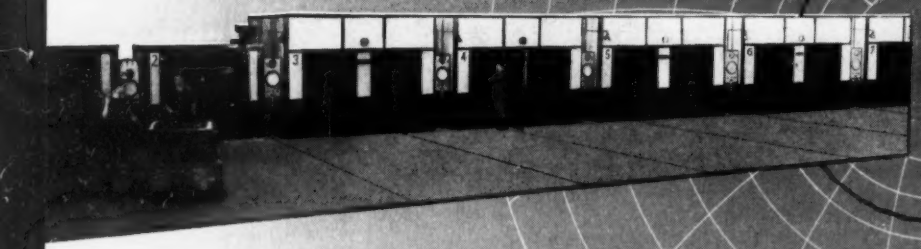
controlled scientifically

To KEEP IMPURITIES OUT of all our dyestuffs, the modern and exclusive equipment *throughout our plant* is as fine and accurate as the finest laboratory equipment. The dryers, for instance, are instrument-controlled to prevent Althouse dyestuffs from "breaking down", so that shade and dyeing properties are more uniform . . . another advantage of Althouse PRECISION dyemaking!

"to the nth degree"

A long row of modern Steam Dryers, partially photographed below, are all instrument-controlled for accuracy and uniformity.



pace-setter in precision dye-making

ALTHOUSE

Chemical Company, Inc.

READING · PA.

But...

ONYXSAN SOFTNESS LASTS!

IF YOU want a soft fluffy finish like new fallen snow... one of the Onyxsans can produce it for you. But the Onyxsan finish will last for the life of the textile when you use it for cotton, acetate rayon or bemberg. Even on other fibers the finish will show outstanding resistance to washing.

And you can get a wide range of softening effects using an Onyxsan finish . . . from mellow and lofty to firm and waxy, depending on which Onyxsan you use.

These cation-active softening agents give finishes that are integral parts of the fiber. They are stable to hard water, electrolytes and organic acids. They develop no odors, rancidity, mark-off or stiffness. They are applied in the padder, jig, quetsch or dye beck without operational changes.

The characteristics and applications of Onyxsan Cationic Softeners are covered in full in Onyx Technical Bulletin TX-1.

Ask us to send a copy... or more, if you can use them!

onyx

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DURABLE Softness

Paramine TA is the modern cationic finish for acetate, viscose, cotton and mixed fibres. Mills using paramine TA for dress goods, glove fabrics, tricot and other types of knitted materials have found this finish offers added sales appeal.

Thorough penetration of Paramine TA assures a softness within the yarn itself that gives materials a full hand and desirable drape—its substantive action produces a durable, lasting finish —Application is simple.

Use Paramine TA

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WRITE FOR DETAILS OR DEMONSTRATION

Arkansas Co. INC.

Manufacturers of Industrial Chemicals for Over 40 Years

NEWARK, NEW JERSEY

American Dyestuff Reporter, Vol. 38, No. 2. January 24, 1949. Published every other Monday. Copyright 1949, by Howes Publishing Co., Inc., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00. Foreign, $10.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.

BETTER

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Better production and better quality of finished fabric are synonymous with the name

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World's largest manufacturer of machinery for processing modern fabrics

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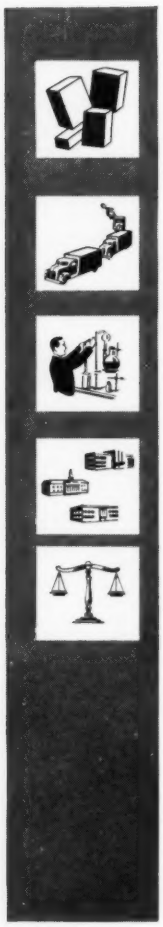
LET'S START '49 WITH THIS SIGN?



Do you know another manufacturer in New England that can offer you a complete line of products for your finishing and dyeing departments — such as chip soaps, solid soaps, cold scour soaps, synthetics, tar removers, detergents, Calex crystals, penetrants (both dyehouse and carbonizer), formaldehyde, stripping agents, etc.?

Do you know another manufacturer in New England that can offer you practically overnight deliveries to your mill with their own fleet of trucks, driven by their own courteous drivers?

Do you know another manufacturer in New England that has a trained and experienced staff of technical representatives capable of talking over your troubles, even to the extent of taking off their hats and coats and going to work in your mill, if necessary?

Do you know another manufacturer in New England that, in addition, backs up these men with three separate laboratories (Research, Analytical and Plant Control), directed by men with long experience?

Do you know another manufacturer in New England that can offer you all these advantages and still maintain a price structure which is equal to, and in many cases, lower than competition?

We feel you'd like to know these facts. If you weigh them, give them full consideration, we're sure you'll start '49 with the Watson-Park line. All inquiries will receive our prompt and complete attention.

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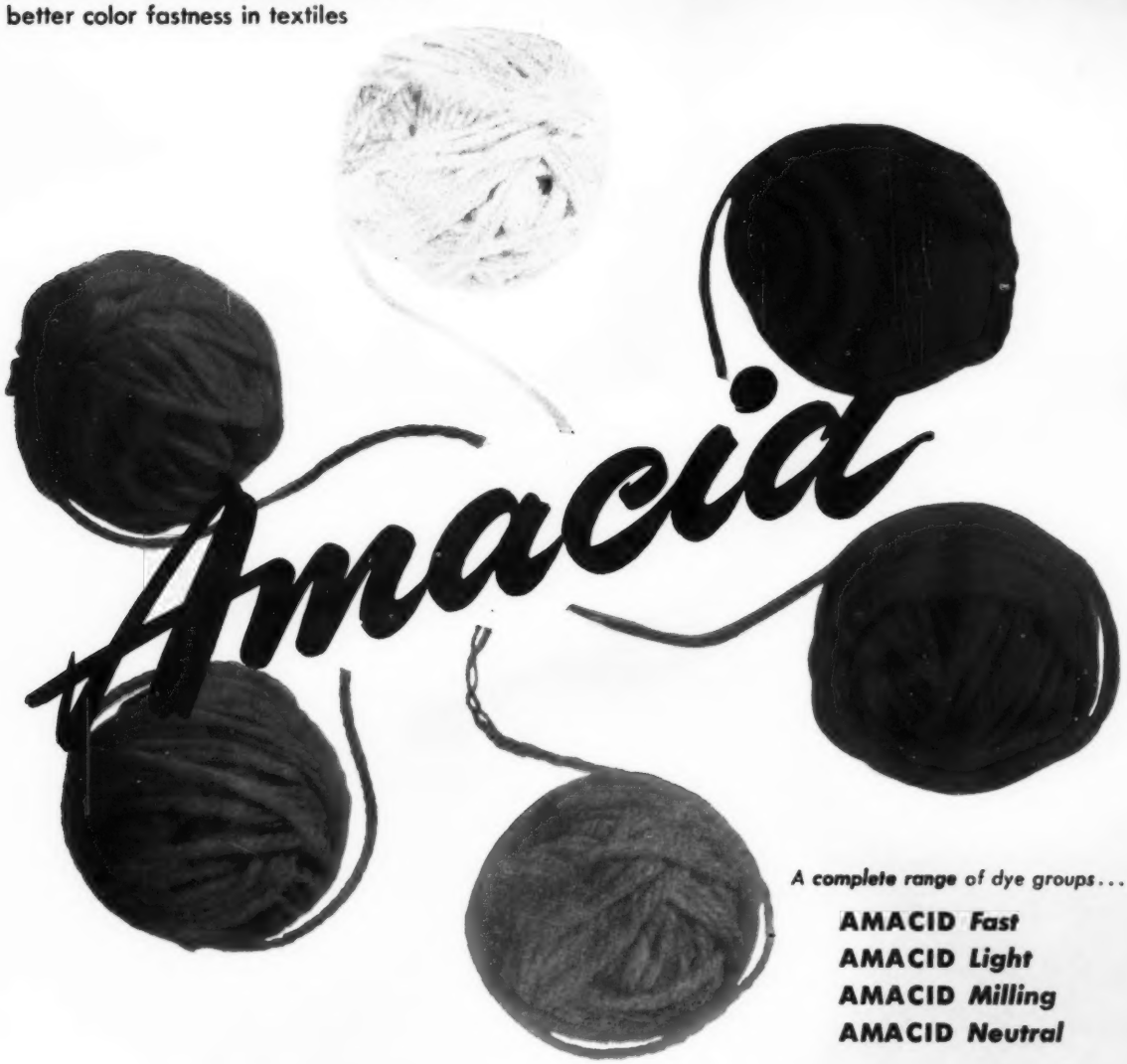
FACTORY · LOWELL JUNCTION · MASS.

Established 1925

AMACID* WOOL COLORS
provide the answer to the demand for better color fastness in textiles



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AMACID *Milling*
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Selected Amacid Dyes are the wool-dyer's defense against color destruction by sunlight, washing, sea-water, carbonizing, perspiration, dry-cleaning.

Amacid colors meet all fastness requirements and shade demands for every type of wool-dyeing.

Another American Aniline achievement in effective color fastness. For detailed information regarding your own particular wool-dyeing requirements, consult our nearest branch. Experienced A.A.P. technicians are always happy to be of service.

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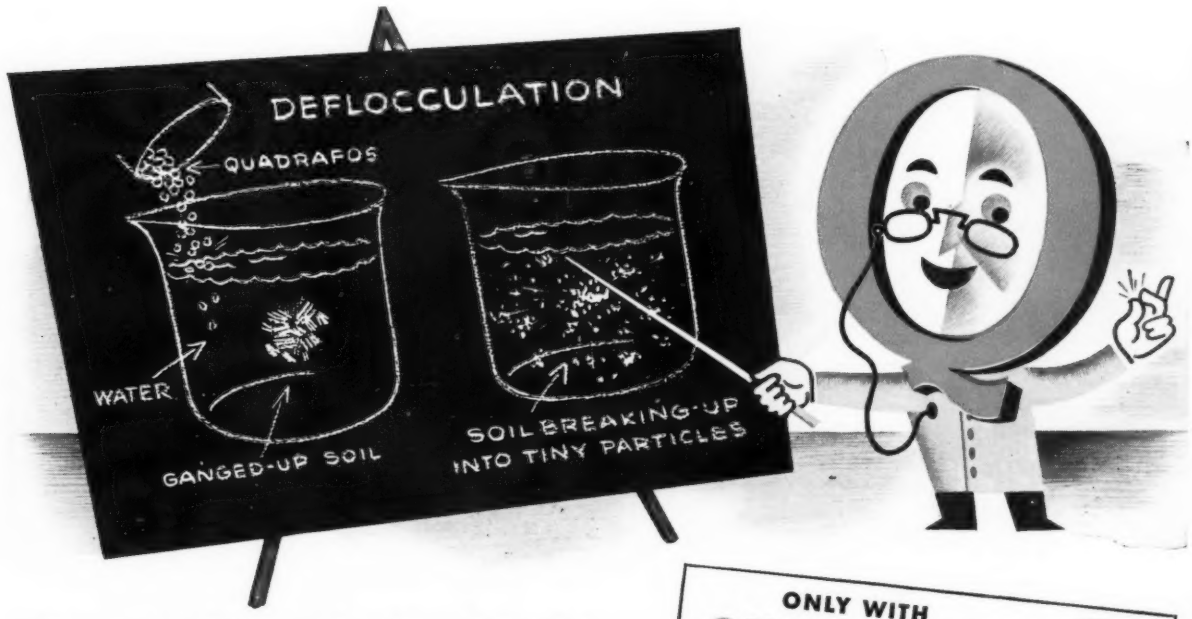
QUADRAFOS* helps break up stubborn soil accumulations in a hurry.

When ganged-up soil particles cause you to dig deep into your soap and alkali barrels to get effective scouring, it's time to call on QUADRAFOS for help.

Because of its powerful deflocculating and dispersing actions, QUADRAFOS gets under and between the ganged-up particles, lifts them off surfaces, separates them and holds them in perfect suspension. Such complete soil removal not only gives you cleaner goods but also leaves them in better condition for subsequent operations.

QUADRAFOS can help you get higher quality and better profits in at least 27 textile processes. For proof, write for all the facts, using the coupon below.



softens water without precipitation...deflocculates ...redissolves precipitates...promotes free rinsing

ONLY WITH QUADRAFOS CAN WATER DO SO MUCH, SO WELL

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Technical Service Department
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Please send me further information about the use of QUADRAFOS in textile wet processing. I'm particularly interested in:

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- ☐ Piece goods scouring
- ☐ Kier boiling
- ☐ Reducing bleach requirements
- ☐ Brighter, more uniform dyeing
- ☐ Viscosity control of printing pastes
- ☐ .....

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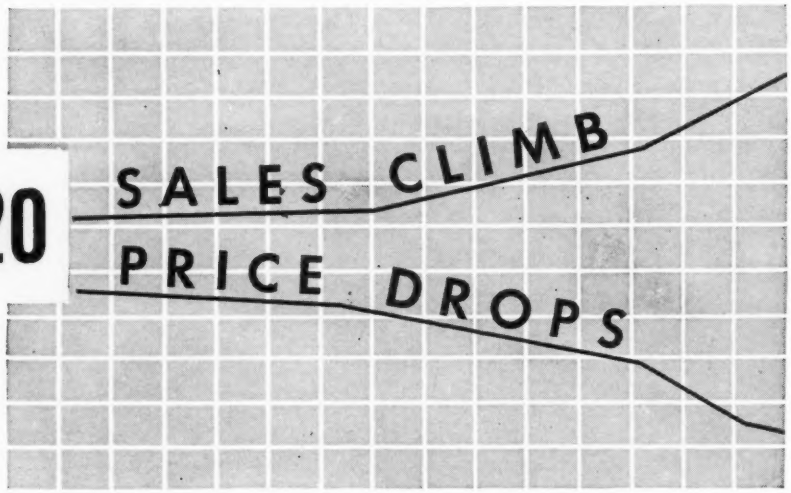
FOR YOUR INFOR[M]ATION

To woolen and worsted spinners:

SYTON W-20



Was 20c lb.

NOW 15¢* lb.

**Includes royalties under U.S. Pat. 2,443,512 issued to Monsanto Chemical Company. Full details and license agreements furnished on request.*

As sales of Syton W-20 climb, Monsanto announces a net price reduction of 25% for woolen and worsted spinners.

Every month, more mills have tried Syton W-20 . . . liked it . . . ordered it . . . and reordered it. This growing volume means lower costs . . . savings which Monsanto is promptly passing along.

Reports from more and more mill men tell how Syton W-20 gives them more efficient spinning at lower costs. Proof that you can get the same results *at a new low price.*

ADVANTAGES SYTON DELIVERS

Syton W-20 adds 10% to 30% to the tensile strength of yarns spun on the woolen or worsted system. With increased strength, spinners can reduce twist, thereby get increased production and loftier yarns. Syton W-20 also enables spinners to produce more uniform yarns closer to limit spins than were previously possible. Weavers and spinners report fewer ends down . . . another major Syton W-20 advantage.

Monsanto research invented Syton W-20 . . . Monsanto technicians adapted it to textile spinning. Monsanto's position as pioneer and leader in the field is confirmed by U.S. Patent 2,443,512 covering the application of silica sols to any textile fiber as an aid to spinning. For information and technical help at your plant send the coupon.

Faster and easier to de-size! Monsanto's Stymer for acetate is easily scoured in warm water containing a detergent. No enzymes or strong scouring agents are necessary. And there's a substantial saving in operating time. A typical mill report says Stymer is washed out in only 30 minutes compared to 1 and ½ hours or more for other sizing materials.

Stymer makes another important time saving in slashing. It does not set up in pipes, boxes or tanks. And it eliminates the time-consuming removal at the end of each working period for sizes which gel.

STYMER

Monsanto's NEW acetate size

SAVES DE-SIZING TIME

ALL THESE ADVANTAGES GO WITH STYMER

1. **Uniform film, exceptionally strong, abrasion-resistant, smooth and flexible.**
2. **Easily applied in a uniform coating on the individual yarn.**
3. **Adheres well to the fiber.**
4. **Reduces static, because it has high conductivity.**

IN SLASHING, Stymer does not stick to uncovered dry cans, stops static electricity troubles, separates easily at the lease rods and does not gel in the pipes or size box.

IN WEAVING, the warps sized by Stymer show little or no shedding, maintain yarn twist, have fewer end breaks and produce a more uniform fabric.

Stymer is a development of Monsanto research. The Monsanto technicians who helped introduce Stymer are ready to work with you at your own mill.
Just send the coupon for Monsanto's technical bulletin describing sodium Stymer for acetate slashing. Or for assistance with Stymer by Monsanto. Syton, Stymer: Reg. U. S. Pat. Off.

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A DESCRIPTIVE BROCHURE IS AVAILABLE

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a dyestuff for cellulose acetate yarn

EASTMAN

FAST YELLOW 4RLF

Eastman Fast Yellow 4RLF dyes cellulose acetate yarn and fabrics bright golden shades of yellow with exceptional fastness to sunlight. In pastel shades, twenty-five to forty hour lightfastness is obtained; and, of the fast-to-light acetate yellows, this dyestuff is one of the fastest with respect to washing. Pieces dyed with Eastman Fast Yellow 4RLF also have high resistance to sublimation and perspiration.

Eastman Fast Yellow 4RLF dyes over a temperature range of 160°F. to 190°F. It leaves cotton and viscose rayon white and is suitable for cross dyeing. It is highly recommended for the dyeing of drapery and other fabrics which require extreme fastness to light and gas fading.

Eastman Acetate Dyestuffs are available in a wide variety of useful colors for the dyeing of cellulose acetate yarn. Additional information concerning these dyes and their application to fibers and fabrics may be obtained by writing to Tennessee Eastman Corporation (Subsidiary of Eastman Kodak Co.), Kingsport, Tenn.

Eastman Acetate Dyestuffs

How NOPCO* FUA

cuts your wool processing costs

3% **OF NOPCO FUA**

applied to stock is all you need—3 lbs. NOPCO FUA per 100 lbs. wool—as against

8% **OF CONVENTIONAL WOOL OILS**

This tremendous differential is only one of the reasons why this initially *higher priced* product is proving the *most economical* of all wool oils in actual performance. Other reasons are

100% **ELIMINATION OF SOAP**

NOPCO FUA *eliminates the need for all soaps and detergents* in fulling and scouring. It also stops static completely during carding. It does not rust or corrode. NOPCO FUA is anhydrous, all fatty, contains no mineral oil or hydrocarbons—is salt free and ash free.

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They mean . . . increased production quality and volume, valuable savings of time and equipment, reduced cost of *all* operations. Try NOPCO FUA in *your* mill. Give *your* woolens the benefit of its many exclusive advantages, its unparalleled versatility.

NOPCO EVOLVED THIS THROUGH RESEARCH

SEND FOR NOPCO FUA TECHNICAL BULLETIN

Mail coupon today and get *all* the facts about NOPCO FUA's versatile aid to better wool processing.

NOPCO CHEMICAL COMPANY. Harrison, New Jersey

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PUBLISHED BY *AMERICAN Cyanamid COMPANY* CALCO CHEMICAL DIVISION
Bound Brook, New Jersey
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CALCO NOW PRODUCES FASTEST VAT YELLOW FOR DYEING OR PRINTING

Available in powder or paste form for dyeing, Calco's new vat yellow has the best over-all fastness properties of any vat yellow obtainable at present. Belonging to the anthraquinone class, Calcosol* Fast Yellow Paste produces a clear, bright true yellow which withstands long exposure to light—even in very pale shades. Its fastness to light, chlorine, towel bleach and washing recommend it for coloring towels, draperies, sheets and similar applications. It is also available as the dispersed powder under the name of Calcoloid Fast Yellow Double Powder.

Calcosol Fast Yellow Printing Paste gives performance under the Fadeometer equal to that of the dyeing type. In medium and heavy shades it will stand 150 or more Fadeometer hours without color loss. Its fastness to washing, chlorine, crocking, dry cleaning, perspiration, water spotting and collafuse is excellent. It gives exceptional results in Plissé printing; and it is highly recommended for drapery printing and other applications where a fast vat yellow is important. On viscose rayon or cotton it produces rich shades; and it is a good fast yellow element when used in combinations.

*Trade-mark

New Soluble Vat Dye Calco Soluble Vat Brown RR

Calco Soluble Vat Brown RR has just been announced, and it is the soluble vat dye form of Calcoloid Brown RRP Paste. It can be applied by the usual plant procedure for Soluble Vat dyes and is suitable for roller printing, screen printing, cotton dyeing and wool dyeing.

With Calco Soluble Vat Brown, prints and dyeings are produced having fastness properties comparable to the corresponding vat dye. It is recommended for the production of a range of brown shades when used either by itself or with other soluble vat dyes as shading elements.

Calco Soluble Vat Brown augments the present Calco Soluble Vat Dye line for the production of a much wider range of shades.

Dullness or Brightness in a Single Dye

It is usually easy to dull down a bright dye to obtain a duller shade during dyeing operations, if the flatter shade is required. However, every dyer knows that if his available dyes are already dull, it is generally impossible to get that extra brightness without adding an extra dye at the expense of some of the desired fastness properties in the final result.

Calcocid Alizarine Blue SAPG and Calcocid Alizarine Blue SE are exceptionally clear, bright types of Acid Alizarine Blues. They are versatile colorants since they can be dulled in the mill where necessary—*and when you want extra brightness—they have it!*

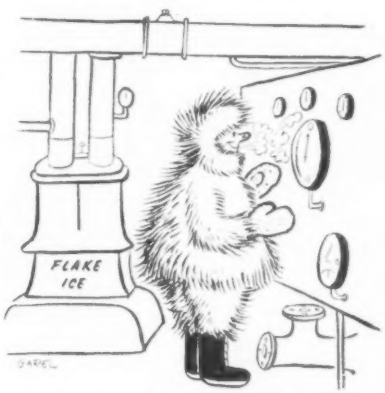
Request samples of these Calcocid Alizarine Blues from your Calco representative, and compare them today.

FOR THE TEXTILE BOOKSHELF

Calco Technical Bulletin No. 807—"Dyeing Studies at Elevated Temperatures" by G. L. Royer and C. L. Zimmerman, Calco Research Department, and H. J. Walter and R. D. Robinson, Bachmann Uxbridge Worsted Corporation, Uxbridge, Mass.

Following the concept of continuous dyeing at high temperatures under pressure by H. J. Walter, president of Bachmann Uxbridge Worsted Corporation, the Research Department of the Calco Chemical Division, American Cyanamid Company, began, in 1941, a cooperative investigation with the Bachmann Uxbridge Worsted Corporation on a fundamental study of the dyeing of wool and wool-cotton unions at high temperatures under pressure. This bulletin reports methods developed for dyeing textile fibers at temperatures in the range of 200° F. to 300° F.

The high temperature technique increases the speed of dyeing to such an extent that dyeing, which normally requires hours, can be produced in a matter of seconds. This increased speed of dyeing makes it practical to dye continuously at a rapid rate many fibers which previously have not been dyed by a rapid continuous process.



250 tons of ice can be produced daily in Calco's ice plants

ATLANTIC PETROLEUM CHEMICALS

ULTRAWET SK BEAD

Will this Ultrawet do your job best?

You are looking at a microphotograph of Atlantic Ultrawet SK bead. It contains a minimum of 35% active alkyl aryl sulfonate. This particular Ultrawet has many uses, including household detergents, cosmetics, industrial applications, dry mixing with alkalis and in the manufacture of scouring powder.

It has these advantages: whiteness, controlled density, lack of odor, uniformity. It is free-flowing and is shaped to go to work quickly.

Behind Ultrawet SK bead are Atlantic's research and production facilities, and more than 10 years' experience in producing quality surface-active agents.

● APPLICATIONS	● ULTRAWETS					
	30E	30DS	35K	SK	E	K
Form:	Liquid	Liquid	Liquid	Bead	Flake	Flake
Minimum % Solids:	30	30	35			
Minimum % Active-Solids:	85	85	90	35	85	85
EMULSION BREAKING	✓					
LIGHT-DUTY HOUSEHOLD DETERGENTS				✓		
PENETRANT	✓	✓				
INDUSTRIAL DETERGENTS					✓	✓
HEAVY-DUTY HOUSEHOLD DETERGENTS						✓
EMULSIFIER					✓	✓
WETTING AGENT	✓	✓				
CHARGE STOCK FOR SPRAY AND DRUM DRYING			✓			
DRY MIXING WITH ALKALIS				✓	✓	✓
LIQUID HOUSEHOLD DETERGENTS		✓				
COUPLING AND SOLUBILIZING	✓					

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Ny-dull gives clear even Dullness to Mono-Filament Hose

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Proved completely correct, first by Laboratory tests, then by extensive, long-run, practical application, Ny-Dull removes shine . . . gives clear, even, dulling. Any desired degree of body with good boarding properties may be obtained when Ny-Dull is used in conjunction with Fantachine and Resin D-257.

Your Fancourt field man has the whole story. Write, wire or call him. He'll be glad to show you what Ny-Dull can do to improve your Mono-Filament production.

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Solving Finishing Problems Since 1904

EXTRA ECONOMY

SULFRAMIN E Liquid is the most economical form of synthetic detergent you can buy today. If economy is to be your watchword in 1949—start right now—order SULFRAMIN E and save!

EXTRA EFFICIENT DETERGENT

Lower cost combined with greater efficiency is like holding aces back to back. Treat yourself to a trial run on SULFRAMIN E Liquid—then relax, secure in the knowledge that your cleaning job will be done more economically and more efficiently.

EXTRA EASY TO USE

SULFRAMIN E Liquid is delivered ready to use. No dust! No boiling! No stirring! Just open the drum top and dip in—or empty a full load of SULFRAMIN E into your storage tank and pump it, as you need it, through your pipelines to the job.

AVAILABLE IN DRUMS, TANKWAGONS AND TANKCARS

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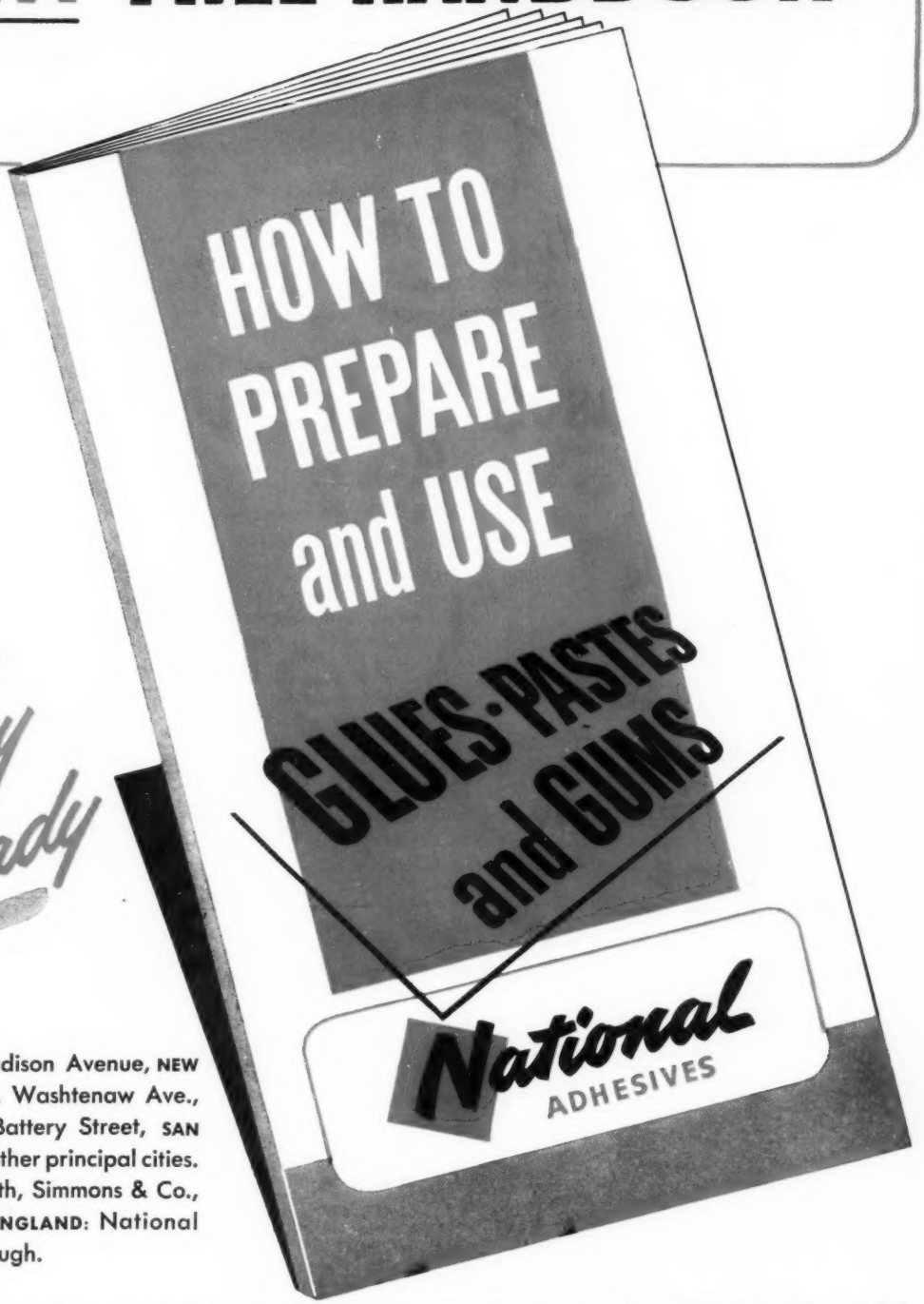
Textile Detergent Operations

OPERATION AND FIBER	PURPOSE OF OPERATION	DETERGENT PROPERTIES REQUIRED	DETERGENT RECOMMENDED
KIERBOILING Cottons	To remove natural waxes, motes, pectins and soil; to improve absorbency	Rapid penetration and/or soil removing and suspending action	Certified Flint *Regal *Energetic
BOIL-OFF 1. Cotton	To remove natural waxes, motes, pectins and soil; to improve absorbency	Rapid penetration and/or soil removing and suspending action	Certified Flint *Regal *Energetic
2. Synthetics including hosiery	To remove spinning oils, sizing compounds and soil	Good detergent action; in some cases leveling properties	Certified Flint Giant *Energetic *Triumph
CONTINUOUS BLEACH Cottons	To remove natural waxes, motes, pectins and soil; to improve absorbency	Rapid penetration	*Regal
DESIZING Cottons	To remove size	Rapid penetration and wetting action	*Regal
SCOURING 1. Raw wool	To remove grease and dirt	Good detergent properties. Easy solubility and rinsability	Re-Nu Texscour Certified *Triumph *Regal
2. Wool piece goods and yarn	To remove spinning oils and soil	Oil emulsification	Texscour Certified *Regal
DYEING 1. Cottons	To improve dye penetration and leveling action	Stability to acids often necessary	*Regal *Energetic
2. Wool	To perform leveling action	Dye suspending action; stable to acid	*Energetic
SOAPING 1. Cottons dyed	To remove excess dye; bringing up color	Maximum detergent action	Flint *Triumph *Energetic
2. Prints	To remove gums, starches, etc.	Maximum detergent action	Flint *Triumph *Energetic
FULLING Wool	To aid in fulling operation and scouring	Good lubricant properties	Flint Certified
FINISHING 1. Cottons	To apply a soft hand to goods	Low titer; freedom from rancidity	Certified Texcour
2. Synthetics	To provide scroop	High titer; freedom from rancidity	Flint

***Synthetic detergent**

Additional copies of this chart, and full information on any product may be secured from ARMOUR AND COMPANY, Industrial Soap Division, 1355 W. 31st Street, Chicago 9, Illinois.

NEW FREE HANDBOOK



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EVERY TYPE OF ADHESIVE FOR EVERY INDUSTRIAL USE

Brightness and Economy are Characteristics of

Pharmasol* Golden Yellow N

*Reg. U. S. Pat. Off.

PHARMASOL Golden Yellow N produces clear, bright, fast and economical golden yellow shades when printed on cottons or rayons.

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DYESTUFF REPORTER

Incorporating Textile Colorist and Converter

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George S. Buck, Jr.

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Proceedings of the
American Association of Textile Chemists and Colorists

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January 24, 1949

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TREASURER'S REPORT

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS
STATEMENT SUMMARIZING RECEIPTS AND DISBURSEMENTS FOR THE YEAR ENDING JULY 31, 1948

		Allocation of Funds								
			Special Research Projects							
	Total	*General Research*	*International Salt Company*	*Association of American Soap and Glycerine Producers*	*U. S. Army Quartermaster Corps (Note)*	*U. S. Army Chemical Warfare Service (Note)*	*American Viscose Co. Scholarship Fund*	*Olney Medal Fund*	*Merchandise*	*General*
Receipts:										
Membership dues:										
Corporate memberships	$ 35,175.00	$33,022.50		$...	$ ...	$ ...	$ ...	$ ...	$ ...	$ 2,152.50
Sustaining memberships	432.50	432.50		...	...	...	...	...	...	...
Senior, Junior, Associate and Student Memberships	38,211.50	...		...	...	...	...	...	...	38,211.50
Total membership dues	$ 73,819.00	$33,455.00		$...	$ ...	$ ...	$ ...	$ ...	$ ...	$40,364.00
American Viscose Company—scholarship donation	1,500.00	...		...	...	...	1,500.00	...	...	...
Annual meeting registrations—net amount received from Mid-west Section	1,136.90	...		...	...	...	...	...	...	1,136.90
Dividends and interest received	1,492.80	817.00		...	...	...	...	250.80	...	425.00
Miscellaneous income, per accompanying schedule	11,389.63	170.00		...	...	...	...	...	11,219.63	...
Special research projects	43,221.95	...		...	13,216.54	30,005.41	...	...	...	...
Total receipts	$132,560.28	$34,442.00		$...	$13,216.54	$30,005.41	$1,500.00	$ 250.80	$11,219.63	$41,925.90
Disbursements:										
Research salaries and expenses	$ 58,793.58	$15,280.72	$2,724.16	$...	$10,370.58	$30,418.12	$ ...	$ ...	$ ...	$ ...
Howes Publishing Company—Subscriptions to American Dyestuff Reporter	13,462.50	...	...	...	...	...	...	...	45.00	13,417.50
Disbursements for account of American Viscose Company scholarship	1,534.25	...	...	...	...	...	1,534.25	...	...	...
Disbursements for account of Olney Medal Fund	113.67	...	...	...	...	...	...	113.67	...	...
Secretary's expenses, clerical assistance, etc.	9,517.09	15.25	...	...	...	...	...	...	300.56	9,201.28
Printing, etc.	712.61	59.01	...	...	...	...	...	...	60.50	593.10
Publicity	428.08	113.07	...	...	...	...	...	...	...	315.01
Merchandise purchases and expenses	10,683.29	...	...	...	...	...	...	...	10,683.29	...
Audit of treasurer's and secretary's accounts	250.00	...	...	...	...	...	...	...	...	250.00
Section membership allowances	1,640.90	...	...	...	...	...	...	...	...	1,640.90
Trade association dues	160.00	...	...	...	...	...	...	...	...	160.00
Bonds for treasurer and secretary	80.00	...	...	...	...	...	...	...	...	80.00
Other general expenses	1,671.52	...	...	...	...	...	...	...	...	1,671.52
Total disbursements	$ 99,047.49	$15,468.05	$2,724.16	$...	$10,370.58	$30,418.12	$1,534.25	$ 113.67	$11,089.35	$27,329.31
Excess (deficiency) of receipts over disbursements	$ 33,512.79	$18,973.95	($2,724.16)	$...	$ 2,845.96	($ 412.71)	($ 34.25)	$ 137.13	$ 130.28	$14,596.59
Cash in banks, advance expense fund and investments (at cost), July 31, 1947	151,890.00	74,399.43	4,919.92	238.30	(5,330.13)	(1,976.97)	625.54	5,417.88	8,781.38	64,814.65
Cash in banks, advance expense funds and investments (at cost) July 31, 1948	$185,402.79	$93,373.38	$2,195.76	$238.30	($ 2,484.17)	($ 2,389.68)	$ 591.29	$5.555.01	$ 8,911.66	$79,411.24

Summary of cash in banks, advance expense funds and investments at July 31, 1948:	
Cash in banks	$ 86,629.71
Advance expense funds	2,550.00
United States Savings Bonds, Series F (value at maturity, $40,000; redemption value at July 31, 1948, $33,020), at cost	29,600.00
United States Savings Bonds, Series G (face value $20,000; redemption value at July 31, 1948, $19,240), at cost	20,000.00
$10,000 United States Treasury Bonds 2½% 1967-72 at cost (value based on market quotations July 31, 1948, $10,025)	10,017.68
Other marketable securities, at cost (value based on market quotations July 31, 1948, $33,050)	36,605.40
	$185,402.79

Note: The Association has undertaken research projects for U. S. Quartermaster Corps and U. S. Army Chemical Warfare Service, covered by negotiated contracts under the terms of which the Association is to be reimbursed for salaries and expenses in total amounts not exceeding $25,000 and $40,000 on the respective government agency contracts. The balances of $2,484.17 and $2,389.68 shown above as deficiencies of receipts over disbursements for these projects at July 31, 1948 represent salaries and expenses which had not been reimbursed by the U. S. Government as of that date.

Respectfully submitted,
W. R. MOORHOUSE, Treasurer
American Association of Textile Chemists and Colorists.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS
SCHEDULE OF MISCELLANEOUS INCOME FOR THE YEAR ENDING JULY 31, 1948

Miscellaneous income:		
Research:		
Launder-Ometer royalties		$ 170.00
Merchandise:		
Multi-fibre cloth royalties	$ 973.85	
Yearbooks	2,440.86	
Dye standards	383.40	
Knitted tubing	227.45	
Dyestuff Reporters and reprints	155.40	
Crock-meter cloth	1,144.07	
Crock meters	2,596.60	
Moth cloth	713.75	
Flammability tester royalties	280.00	
Water-test apparatus	401.25	
Gas fading units	205.50	
Color transference charts	248.00	
Analytical methods	17.00	
Buttons	29.50	
Color index charts	1,400.00	
Dry cleaning unit	3.00	11,219.63
Total miscellaneous income		$11,389.63

Respectfully submitted,
W. R. MOORHOUSE, Treasurer
American Association of Textile Chemists and Colorists.

PRICE, WATERHOUSE & CO.
75 Federal Street
Boston 10

September 30, 1948

To the Members of the
American Association of Textile
Chemists and Colorists:

We have made an examination of the accompanying statement and supporting schedule summarizing the receipts and disbursements of the treasurer and secretary of the American Association of Textile Chemists and Colorists for the year ending July 31, 1948. In connection therewith, we examined or tested the cash-books and other records supporting the receipts and disbursements, by methods and to the extent we deemed appropriate, but we did not communicate with the members to confirm the amount of recorded receipts from dues and subscriptions.

In our opinion, the accompanying statement, together with the supporting schedule, fairly summarizes the recorded receipts and disbursements of the association for the year ending July 31, 1948 and the balances of cash in banks, advance expense funds and securities owned as of that date.

Price, Waterhouse & Co.

1949 Meeting Dates, Hudson-Mohawk Section

THE following meetings dates for 1949 have been announced by the Hudson-Mohawk Section:

March 18; May 20; June 17 (outing); September 16; November 18.

The first meeting was held January 21st.

Winter Meeting of Piedmont Section to be Held on January 29th

THE Winter Meeting of the Piedmont Section will be held at the Poinsett Hotel, Greenville, South Carolina, on January 29th. The technical session, to be held at 3:30 P.M., includes two papers: "Textile Printing Thickeners," by Dave E. Truax of Stein, Hall & Co., and "Preparation of Cotton Goods," by J. Leon Moore, Electrochemicals Dept. of the DuPont Company. A banquet is scheduled for 7:30 P.M. and Norman F. Barnes of the General Engineering and Consulting Laboratory of General Electric Company will discuss "Color Facts and Fantasies."

CALENDAR

WESTERN NEW ENGLAND SECTION
Meetings: February 25, April 8, May 20.

NEW YORK SECTION
Meetings: January 28, March 4, April 1, May 6.
Outing: June 17.

PHILADELPHIA SECTION
Meetings: January 28, March 11, April 15, May 20, September 16, November 11 (Kugler's, Philadelphia).
Outing: June 10.

PACIFIC COAST SECTION
Meeting: February 11 (Mona Lisa Restaurant, Los Angeles, Calif., "The New Look in Textiles," Raymond W. Jacoby).

PIEDMONT SECTION
Meetings: January 29 (Poinsett Hotel, Greenville, S. C.), April 2 (Robert E. Lee Hotel, Winston-Salem, N. C.), June 24, 25, 26 (Ocean Forest Hotel, Myrtle Beach, S. C.), November 5 (Charlotte Hotel, Charlotte, N. C.)

HUDSON-MOHAWK SECTION
Meetings: March 18, May 20, September 16, November 18.
Outing: June 17.

COUNCIL
Meetings: January 28, March 25 (Hotel New Yorker, New York).

RESEARCH COMMITTEE
Meetings: January 28, March 25 (Hotel New Yorker, New York).

NATIONAL CONVENTIONS
1949: October 13 to 15, Chalfonte-Haddon Hall, Atlantic City.
1950: October 19 to 21, Statler, Boston.

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

48-19

Education: B.S. in textile chemistry and dyeing, N. C. State College.
Experience: Direction of textile testing and development, with some teaching.
Age 29; married; references; U. S. west coast preferred. 12-27, 1-10, 1-24, 2-7

48-22

Education: High school with night courses in textile school.
Experience: Boss dyer, with general experience, particularly wool and rugs.
Age 49; widower; references; will go anywhere in U. S. or Canada. 12-13, 12-27, 1-10, 1-24

48-23

Education: B.S., University of Bombay; M.S. expected from Lowell Textile Institute, January, 1949.
Experience: Chemist and director of dyeing, India.
Age 33; married; will go anywhere. 12-13, 12-27, 1-10, 1-24

48-25

Education: R. I. School of Design, evenings.
Experience: 24 years, 10 as Boss Dyer, with same company, recently liquidated; varied experience, in particular warp, skein and package dyeing, and bleaching.
Age 53; married; N.E. preferred, as dyeing supervisor or demonstrator. 1-10, 1-24, 2-7, 2-21

48-26

Education: Textile School.
Experience: 31 years overseer and superintendent of cotton bleaching, dyeing and finishing; retired at age limit.
Age 66; in excellent health; married; interested in work anywhere along Atlantic coast. 1-24, 2-7, 2-21, 3-7

49-1

Education: B.T.C., Lowell Textile Institute.
Experience: Laboratory technician, cost research, quality control, following army service.
Age 26; married; references. 1-24, 2-7, 2-21, 3-7

49-2

Education: High school, with college evening courses in chemical engineering.
Experience: Chemist, U.S. Navy and dye house.
Age 27; married; vicinity of New York City preferred. 1-24, 2-7, 2-21, 3-7

BROADCAST FROM STATION WBBQ, AUGUSTA, GEORGIA

Augusta National Convention, October 23, 1948

The following is the transcription of a broadcast made from Station WBBQ, Augusta, Georgia, on October 23, 1948. This took place during the National Convention of the AATCC held in that city.

Announcer—Good afternoon, everyone. This week Augusta has been honored by having in its midst the members of the AATCC. This organization, comprising some 6,000 leaders of the industry, has been in session since Wednesday at the Bon Air Hotel. While much of the business transpiring during a convention of this nature is of technical interest to those attending, there are many important phases which concern men and women in all walks of life, and it is with this thought in mind that we have asked some of the delegates to sit in with us for the next 30 minutes and discuss some of the developments in which we, as consumers, will be interested. Our panel this afternoon includes: Miss Helen Thackeray, General Foods Corporation of New York; Miss Antoinette Falcone, Associated Merchandising Corporation of New York; Mr. Henry F. Herrmann, General Dyestuff Corporation of New York and President of AATCC; Mr. Charles W. Dorn, Director of the Research Laboratory, J. C. Penney Company of New York and Chairman of the New York Section of AATCC; and Dr. Louis A. Olney, for seven years President of AATCC, for twenty-five years Chairman of Research, and now President Emeritus. Also in the studio with us this afternoon we have Mr. Arthur R. Thompson, Publicity Chairman for this Convention and a representative of the Ciba Company, Inc., of Charlotte, North Carolina and Mr. Robert W. Philip, Entertainment Chairman for this Convention and Vice-President of Callaway Mills, LaGrange, Georgia. During our broadcast of the ensuing 30 minutes our questions will be posed by Miss Thackeray and Miss Falcone.

Question—Mr. Herrmann , I'm sure that our audience would like to know something about the AATCC.

Mr. Herrmann—I am glad you asked that question because our announcer used the term AATCC which might be rather confusing to anyone not familiar with it. The initials mean the AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS—and whereas we comprise a membership of about 6,000 of the technologists of the industry there are many thousands of others who are eligible for membership who simply haven't got around to joining us. It is probably our duty to go after them. I would like to correct any impression that the industry comprises only 6,000 technologists; probably 25 to 30,000 would be a better figure. Now, to answer the question "Who are we?" We are not the owners of the textile industries, we are not the employers but to a large extent belong to the employee bracket, the technically trained operating personnel which runs the industry and, as such, the technical problems of the industry are our responsibility. Our Association is trying through organized thinking and through co-operative effort, to determine how we can advance the efficiency of the wet processing portion of the textile industry. We do not have any benevolent programs for mill employees and we have no political aspirations. Our work is entirely along the technical lines of the industry. We endeavor to help the manufacturer of textiles deliver the types of fabrics the public wants and we wish to convey to the ultimate consumer a better understanding of what is available and to teach him how to ask for it. We do not engage in research aimed at the production of new things, whether they be dyes, fabrics or finishes, but we study and interpret those which are available so that the best possible use can be made of them.

Question—Dr. Olney, just what is textile chemistry doing to assist quality in textiles?

Dr. Olney—In recent years the number of textile chemists has greatly increased. This is indicated by the fact that the membership of the AATCC has grown from 200, 25 years ago, to nearly 6,000 at the present time. Textile chemists are working with chemical and textile manufacturers endeavoring to give us such products as non-shrinkable, nonwrinkable, moth resistant and water repellent fabrics colored with dyes of satisfactory fastness.

Question—Dr. Olney, won't you go just a little further and tell us exactly in what way the AATCC works for the interests of the consuming public?

Dr. Olney—The AATCC, through its 50 or more committees and research laboratories at the Lowell Textile Institute is working constantly to provide the methods which furnish means for the textile manufacturers, department stores and retailers in general to establish the relative values of every fabric for its end use.

Question—Dr. Olney, will you tell us just what you mean by end use, and its bearing upon textile manufacturing processes?

Dr. Olney—In order to intelligently dye and finish textile fabrics the manufacturer must know for what purpose they are finally to be used.

For instance, fabrics for women's evening dresses which in most cases are worn but a few times and then exposed only to artificial light need not have great fastness to light, yet on the other hand cloth for a man's overcoat must have extreme fastness to light and rain. Again, if for instance the manufacturer of yarn is asked to dye the yarn red he must know whether it is to be used in the manufacture of men's garters which need have no special fastness to light or water, or if it is to be used for the red stripe in an American flag where it must have extreme fastness to both light and water. You will thus see that dyes usable for one purpose might not be at all satisfactory for another. This in general is what we mean by end use.

Question—Mr. Dorn, what is the retailer doing to insure quality?

Mr. Dorn—The retailer is doing quite a number of things to improve quality of merchandise. The retailer of course has his own Trade Association, the National Retail Dry Goods Association. This Association has a technical committee which has done much to improve the quality of merchandise. This committee studies faults as they develop in new products and makes every effort to have these faults corrected as quickly as possible. The committee leans heavily on the AATCC for cooperation. These two associations have developed methods where highly flam-

mable textiles can be completely eliminated from the market. The AATCC has given many valuable test methods to the retailer so he can determine whether or not a fabric is washable, how it is to be washed, and, if it is not washable, he has tests to show whether or not it is dry cleanable. Many of these retailers have their own laboratories and with these laboratories make an effort to give the public the best value for their money.

Question—Mr. Dorn, if the merchandise isn't labeled how can the customer be sure that she is receiving quality?

Mr. Dorn—The customer should ask the sales person in the store, bearing in mind that the sales person must know the intended end use of the merchandise.

Question—Mr. Dorn that is very interesting. If I might speak as a consumer I think the Association is certainly doing a lot to help people get quality in Fabrics but I think we as consumers have a responsibility. I think that something on which each one of us might express an opinion is just what is the responsibility of the consumer in protecting quality of fabrics for textiles in general. Mr. Herrmann, will you give us an idea on that to start us?

Mr. Herrmann—First, it takes a proper understanding of what a fabric can be expected to stand in the way of service. As you know, it is the ladies of the country that do most of the spending for apparel and home decoration and we assume that any housewife wishes to spend her money wisely—and can do so if she knows what to buy. Usually this involves a knowledge of the end of the material she is looking for, which she must reveal to the sales person in order that the store can make a proper recommendation to her. "End Use" is a comparatively new term which means the purpose for which a fabric is intended—since it makes a big difference whether the material is intended for washable garments, upholstery, occasional evening wear or other equally divergent applications. If the lady is a good housekeeper and takes good care of her purchase she can expect satisfaction from it. I am really giving away the answer indirectly when I say "good care." What constitutes good care? One must know whether a material can be laundered, whether it must be washed by hand in mild, tepid suds—or whether it must be dry-cleaned. One must make a distinction between goods that are designed to withstand outdoor exposure and are, therefore, sufficiently faster to light than materials which have no such guarantee and are intended to be used only indoors. So I would start this discussion off by saying: Buy the right merchandise suited for the intended end use and know enough about how it must be serviced so that you can clean it correctly. If it is susceptible to moth damage—takes this into account. If it must be dry-cleaned, don't wash it. Other similar precautions I believe most everyone is acquainted with.

Announcer—Speaking from the other end of the table, a couple of years ago I bought a golf jacket that was supposed to be water repellent. Not knowing better, I wore it in the rain on the golf course and I was soaked through and through. Now, is your organization doing anything in that direction, either to correct such a situation or improve that type of jacket?

Mr. Dorn—I think that it is important that the consuming public understand that we have two distinct types of water repellent treatments. There are those processes which are known as the re-treatable water repellent treatments which require an additional application of water repellent each time the article is washed or dry cleaned. There are also durable treatments which do not require re-processing after washing or dry cleaning. The one requirement is that all soap be removed from the garment after washing. If this is done you will still have a water repellent fabric.

Mr. Herrmann—I understand that even though a fabric has been made water repellent by either of these two treatments, the manufacturer of the garment has the responsibility to so assemble and design the garment that he enhances the repellency of the fabrics and does not spoil it. He might lose entirely the original repellency by putting together two materials, either by sewing, lining or padding, which do not belong together and will not work together. Unfortunately, it is possible to create a non-water repellent garment entirely out of materials which individually and separately are all water repellent.

Mr. Dorn—I know that is true. It has been shown that if the outer part of a garment is water repellent and the lining is not, the lining can suck water through the outer shell to such an extent that it ruins the water repellency of the outer part. I also would like to point out that the water repellent treatment may be excellent but if the cloth to which it is applied is not woven tightly enough, it still is not a water repellent garment because the water can go through the pores of the cloth just as if it were going through a sieve.

Question—Mr. Dorn, is there any difference between a water proof fabric and a water repellent fabric?

Mr. Dorn—Decidedly. A water proof fabric is one that has been coated with a film of rubber or plastic or it might even be a plastic film and you cannot pass water through such a fabric. In a water repellent fabric the fibers have been treated to resist water but, through pressure, you can force water through the pores. These two fabrics will have different characteristics to the consumer. A water proof fabric will not breathe and because it will not pass air back and forth, moisture from the body may condense on the inside of the garment and become very uncomfortable. The water repellent garment permits free change of air and moisture from the inside to the outside of the garment.

Mr. Herrmann—Charlie, another interesting thing, the first time I heard of it I was rather intrigued with the idea. I refer to bathing suits which are made water repellent. Certainly the repellency is not supposed to keep the wearer out of the water but I understand the benefit of the treatment is that if the lady makes the mistake of entering the water when she emerges from a bath, the water quickly drains off the garment and in a few moments she is dry, comfortable and warm.

Mr. Dorn—I think this will be interesting to the public. The Federal Trade Commission at the present time is working on methods of labeling rain wear and apparently we will have several grades: shower resistant, rain resistant and storm resistant. The question may be asked why we have a shower resistant coat when we could have one resistant to rain. Well, it all falls back on the ladies who insist on certain types of styles in merchandise which cannot be made sufficiently water repellent to withstand the action of a severe rain. The basis for the labeling system on which the Federal Trade Commission is working is the tests that have been developed over the years by the AATCC.

Question—Mr. Dorn, you have brought me back to some of the responsibilities of consumers when you mention the ladies demanding style material, I would like to introduce a question on color fastness. Many consumers want to know if they should soak new fabrics in salt water to set the colors. I think it is not one of the consumer's responsibilities to set the colors after buying a fabric. In view of all the achievements in improving color fastness, why aren't all colors fast?

Mr. Herrmann—My dear young lady we could talk about this forever. Dye histories usually commence with discussions of Tyrian Purple and the colorings used in the wrapping of mummies. I have pledged myself, when talking about dyes, not to go back to King Tut because he contributed nothing to our present economy and dyestuff industry. The dawn of today's dye industry occurred less than one hundred years ago and subsequent developments have been rapid and amaz-

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Hosiery Group Meeting—

THE APPLICATION OF FAST COLORS TO MERCERIZED COTTON HOSIERY*

C. HARRELL ASBURY

E. I. DuPont De Nemours & Co., Inc.

Introduction

FOR years the manufacturers of cotton hosiery have been marketing their product with colors of poor fastness. While manufacturers of other articles of clothing have been constantly adopting faster colors, the hosiery industry has been satisfied to continue with the same dyestuffs used twenty-odd years ago. The dyestuffs used in work clothing have progressed from mineral colors to sulfurs and now to vats.

There is no valid argument for hosiery being dyed with colors that are not fast, although several have been advanced, attempting to prove fast colors for hosiery not practical. The reasons most often given are lack of experienced dyehouse personnel, fear that off-shade lots could not be remedied, that dyeing costs are prohibitive because the consumer will not pay for improvement in fastness, that direct colors have been satisfactory for years, and that the consumer does not know fast colors can be dyed on hosiery.

All of these objections have been disproved. It has been proved that a good direct color dyer can be trained to dye vats and naphthols. A number of half-hose dyers became familiar with vat colors by dyeing hosiery for the army during the early part of the war. Off-shade lots can be redyed with no more trouble than that faced by the yarn or piece goods dyer. Dyeing costs are only a small part of the retail price of hosiery, amounting to not over a few cents per pair. Furthermore, mills that made both ingrain and solid shades quite often used fast colored yarns in the former, while dyeing solid shades with direct dyes.

Apparently the consumer used to believe that fast colors on solid shades of hosiery could not be obtained, and did not complain when they faded. If a woman bought a gingham or printed dress and had the color run on the first washing, she would probably have returned the merchandise. However, the family hosiery were segregated from the rest of the laundry and hosiery fading was an accepted fact. This consumer ignorance is fast disappearing, and there is a new demand for fast colors on cotton hosiery. In the few years since the war there has been a decided change to vat and naphthol colors by the manufacturers of cotton hosiery.

While it is true that before the war there were some fast colors dyed on this type of hosiery, the output was meager compared with the present. There are probably two main reasons for this relatively sudden demand for fast colors. These are increase in the use of washing machines at home, and knowledge that it is at last possible to buy hosiery dyed with fast colors. When first a sock with poor wash fastness got into her white wash, the housewife was sold on fast colors. Extensive advertising campaigns of manufacturers and sellers then informed her that fast colored hosiery is available. In any case, the fact is that the production of fast colored hosiery has greatly increased. It is the object of this paper to discuss some of the problems encountered in dyeing hosiery with vat and naphthol colors, and the methods used to solve them.

Formulae

THE APPLICATION OF THE NAPHTHOL DYESTUFFS.—The naphthol dyestuffs are usually restricted to shades of red or scarlet. There is no particular difficulty involved in applying naphthols on hosiery that is not found in other types of cotton fabrics. In fact naphthols are usually easier to clean up on hosiery, because excess dyestuffs can be scoured off more readily than from some other materials, such as package dyed yarns.

To apply naphthol colors satisfactorily the usual precautions are necessary. A good supply of soft water should be available. Care should be exercised that the naphthol prepared be properly dissolved.

The average hosiery dyehouse is not supplied with ice, and use of the naphthol bases is rare. The majority of dyers use the fast color salts.

The naphthol prepare most widely used is AS-SW. This penetrates the fabric very well and its exhaust can be slowed by increasing the temperature of the prepare bath. This increase in temperature also aids in penetration.

Sometimes a finished dyeing will have light spots in the heel gores. In most cases this is not due to lack of penetration of the prepare, but to the fact that color salt did not reach the prepare in the cold coupling bath. There is a way to make the color salt penetrate the fabric, but it can be dangerous and can be used only with selected color salts. After the coupling has been completed on the body of the fabric, raise the temperature to about 130° F. for a few minutes. This will cause better penetration and result in coupling. This method should not be used with color salts that are very unstable at 130° F.

A formula for naphthol scarlet, which has been used with good results by several dyers, consists of pasting the AS-SW well with alcohol and dissolving with caustic soda solution. This is added to a dyeing machine containing the proper concentration of caustic soda and a suitable penetrant. The hosiery are worked in this bath at 130° F. for 20 minutes and than 20% common salt is added. After an additional 20 minutes, the machine is drained. The dyeing is next given 3 cold salt washes with 20% common salt to remove the caustic soda. To a third salt bath is added the dissolved fast color salt. 30 minutes are allowed for coupling. The machine is drained, the hosiery washed cold and soaped twice with 2% synthetic detergent and 1% soda ash. The machine is again drained, the hosiery washed at 160° F., cooled and softened.

* Presented at Hosiery Group Meeting, Augusta National Convention, October 22, 1948.

THE APPLICATION OF VAT DYESTUFFS.—Dyeing mercerized cotton hosiery with vat dyestuffs differs from dyeing this fiber in any other form. There are several problems encountered in hosiery dyeing that are unique. In addition to the tendency to surface dye inherent in mercerized cotton, we have a fabric coming from the knitting machine with heels tightly knitted, and often so rolled under that to reach the gore of the heel dyestuffs must pass through several layers of fabric. This is a mechanical problem which might be compared to that of a package dyer trying to dye packages without a pump.

All efforts to apply vat colors by conventional methods, both pigment and reduced, resulted in very poor penetration of the heel. Usually, at the center of the heel gores, there would be an undyed spot. It soon became apparent that radically different dyeing procedures would have to be used if mercerized cotton hosiery were to be dyed with vat colors on a practical scale. There are several procedures now in use which give satisfactory results. They vary in some details, with construction of the hosiery to be dyed and type of dyeing machine used.

Hosiery constructions can be divided into two groups, the fine gauge or very tightly knitted coarse gauge of mercerized cotton, and the loosely knitted, coarse gauge or unmercerized cotton.

The dyeing machines used in the hosiery dyehouse fall into two classes, the revolving type which consists of a partitioned, perforated cylinder for holding the hosiery while it rotates within an inclosing shell; and the paddle type, an open tub in which the blades of a paddle wheel circulate the hosiery by striking the surface of the dyebath.

The revolving machine has two principal advantages over the paddle type. Mechanical action provides penetration of heel gores as hosiery are forced through the dyebath, and different sizes of hosiery are kept separate in the compartments of the cylinder. The revolving machine is better for dyeing all types of hosiery. However, some dyehouses are equipped with only the paddle machines and are getting satisfactory results with them.

Fine gauge or tightly knitted mercerized cotton hosiery should be dyed on revolving machines if possible. If only paddle machines are available, this type of hosiery should not be dyed in nets. It should be dyed loose and shipments made from stock.

Coarse gauge, mercerized cotton, and unmercerized cotton hosiery can be dyed satisfactorily in nets on the paddle machine, and of course are no problem on the revolving machine.

At this point let us examine several typical formulae giving satisfactory results.

COARSE GAUGE HOSIERY DYED IN REVOLVING MACHINE OR IN NETS IN PADDLE MACHINE.—The water ratio will be 15:1. Prepare the dyebath by adding to the machine at 200° F., the following, in the order given: The dispersed dyestuffs, 10% dissolved caustic soda, retarding agent and penetrant.

Load the machine with dry hosiery and work in cooling bath for 25 minutes. By this time the temperature should be 190° F. If not, adjust it with steam or cold water. 10% sodium hydrosulfite is now added slowly over a period of 10 minutes and the dyeing continued for 5 additional minutes. Cold water is turned on and the machine allowed to overflow until the bath is free from caustic soda. To a cold bath is added 1½% sodium perborate. The temperature raised to 160° F. 1% soda ash and 1% synthetic detergent are added and the temperature is raised to the boil. The hosiery are boiled for 10 minutes, given a hot wash at 160° F., cooled and softened.

FINE GAUGE OR TIGHTLY KNITTED MERCERIZED HOSIERY DYED IN REVOLVING MACHINE OR DYED LOOSE IN PADDLE MACHINE.—Fine gauge hosiery are harder to penetrate in the heels, so require a different procedure from that described for coarse gauge hosiery.

The water ratio will be 15:1.

Prepare the dyebath by adding, to the machine at 200° F., the following in the order given:

5% dissolved corn sugar, dispersed dyestuffs, 10% dissolved caustic soda, retarding agent and penetrant.

Load the machine with dry hosiery, or extracted hosiery if prebleached. Work in the cooling bath for 30 minutes. Hold the temperature to a minimum of 180° F., using steam if necessary. Add 10% sodium hydrosulfite over a 10 minute period, and continue dyeing for 15 minutes after the addition of the hydrosulfite, then add 2% more sodium hydrosulfite and dye for 3 minutes. Cold water is turned on, and the machine allowed to overflow until bath is free from caustic soda. The oxidizing and soaping operations are similar to those described for coarse gauge hosiery.

In dyeing the chlorine-fast blues by the procedure just described, 5% white corn dextrine is added with the corn sugar.

Discussion

In all methods for dyeing mercerized cotton hosiery with vat dyestuffs it is essential to dye at temperature higher than that usually recommended for this class of dyestuffs. It is, therefore, advisable to select those dyestuffs that are least affected by the high dyeing temperatures. It is also preferable to use dyes with slow or medium exhaust rates.

At high temperatures corn sugar is a fair reducing agent for some dyestuffs, being used to get a partial reduction. The term partial reduction is to describe the appearance of the dyebath before the addition of sodium hydrosulfite. During this phase the dyestuffs seem in partial reduction only. The color on the hosiery is usually the color of the reduced dyestuffs, while the color of the dyebath is that of the combined oxidized and reduced dyestuffs. Apparently the dyestuffs reduce very slowly, and therefore exhaust from the bath to the fiber very slowly. The amount of dyestuff deposited on the fiber before addition of sodium hydrosulfite varies considerably with the individual dyestuff.

Certain types of dextrine will protect the chlorine-fast blues reduced at high temperatures. We do not know the exact function of the dextrine. However, when dextrine is not present the resulting dyeings are weak, dull, green, and have reduced fastness to chlorine.

The 10% caustic soda recommended may seem excessive, but when the volume of the dyebath is considered, it will be seen that this concentration is less than 1 ounce per gallon. This is the minimum concentration that should be used, on account of the excessive amount of air worked into the dyebath and the high dyeing temperature.

There are, in general, three types of retarding agents in use, namely animal glue, sodium lignin sulfonate, and synthetics. Some synthetic retarders are also good wetting agents, and when they are used, penetrants are usually omitted. The various retarders do not affect all dyestuffs to the same extent; so it is necessary for the dyer to determine for himself the retarding agent for a particular dyestuffs combination. The selection of a retarding agent depends on the depth of shade to be dyed as well as the dyestuffs used. In dyeing medium or heavy shades retarding agents are seldom used. In dyeing light shades, it is most important to use a suitable retarding agent.

Sodium hydrosulfite is necessary to complete reduction of the dyestuffs. Experience has shown better results from hydrosulfite added slowly over a period of about 10 minutes, rather than added all at once. The hydrosulfite breaks down very rapidly at high temperatures, but if it be added slowly, a supply of reducing

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Hosiery Group Meeting—

TREATING AND HANDLING OF NYLON HOSIERY TO PREVENT SNAGGING DURING MANUFACTURE*

A. J. OLSON
Phoenix Hosiery Co.

BEFORE going into our present day problems of hosiery handling during manufacture, it might be well to go back to the days when we were handling silk. On this fiber, the silkworm left a coating called sericin, which protected the fiber through knitting and following operations. While care in handling was necessary, silk was not nearly as susceptible to snagging as we find nylon today. We are attempting to do what the silkworm did, in trying to coat the nylon with a water soluble size to protect it. We are all familiar with the difficulties. The industry is working to improve present sizes and find something more suitable.

It is not the purpose of this paper to solve all the problems on this subject, but rather to give you our experience, as well as that of several other mills in the Midwest. We shall start with nylon in the throwing plant, then go to the looping and seaming department, and follow through each succeeding operation, including the mating and packing departments.

Sizing of Nylon

We have found that the desired amount of P.V.A. size is approximately 3.8% on 20, 30, and 40 denier, and 4% ± 1% coning oil, usually a good grade of vegetable oil. The purpose should be to get on as much size as possible for protection, to the point where good knitting results, with minimum flaking off. Air conditioning of the sizing and coning rooms, as well as the knitting, will minimize trouble in these two operations.

A new synthetic size, a polymerized styrene base resin, was tried experimentally in the same manner as the P.V.A. size. A 4% solution produced too soft a fabric. Increased to 8%, this also proved unsatisfactory. There was not enough stiffness in the fabric to protect it from snagging and it was not firm enough for good seaming. We also encountered heavy stripping of size, which necessitated frequent cleaning of needles and sinkers.

A satisfactory size for nylon knitting yarn must produce a firm fabric which insulates against snagging, and at the same time adheres to the yarn to such extent that there is minimum stripping and corrosion of needles. Our experience with this size to date proves that in its present state it lacks these qualities, and does not compare with the P.V.A. size. Its outstanding advantage would be efficiency of knitting as good at 50° relative humidity as at 80°. A lot of knitting plants are not air-conditioned, and if this can be further developed to where it will give a satisfactory fabric, it will be a big step forward for such mills.

Another treatment being worked on experimentally is coating the leg portion of the hose with Silica Sol, which is a colloidal dispersion of sub-microscopic silica particles in water. It is applied directly to the hose after it leaves the knitter, before looping and seaming. A degree of protection is afforded by its tendency to reduce slipping, and it subsequently reduces the percentage of snags and pulls. Attempts have been made to apply Silica Sol on the knitting machine, but with little success because of the Silica Sol gumming up with the knitting oil. It has been found that the most practical point for application is directly after the hose are knit. The only available method at this stage is to dip the hose into the solution, and follow with hydro-extraction. Because welts and feet are made from twisted sized P.V.A. nylon, these portions cannot be dipped. The size hardens upon drying and the twist is distorted. The dipping therefore must be done in such a way that welts and feet are not entered into the solution. It has been found that a 20% solution of Silica Sol (cold) is the most satisfactory. After the hose have been dipped, a dozen pair at a time, they are wrapped in cotton cloth, with care to tie strings at each end of the leg to prevent excessive seepage of liquor onto welts and toes. The wrapped hose are hydro-extracted for about 30 seconds and after removing from the wrappings are hung up and dried. Then they go to the loopers and seamers, and proceed in the usual manner.

Correctly done, this treatment has been shown to reduce snags and pulls about 50%. It must be noted, however, that it takes some time to work out the procedure, and until operators become accustomed to it, they are likely to increase the percentage of snags by additional mechanical handling. The Silica Sol washes out in the scour and dyeing operation and offers no protection from that point on.

Another attempt to reduce snags has been by sending 15 denier monofilament yarn out to rayon plants to have 10 turns per inch put in, followed by setting the twist and then P.V.A. sizing. While this is rather expensive, it has measurably reduced snags and it produces more elastic hose. The twisting and sizing operation costs approximately $4.50 per pound, or about the same as the original nylon.

The synthetic size application in throwing, and the Silica Sol after knitting, are to my knowledge being tried but experimentally. Results show, however, that they have possibilities. The Silica Sol application after knitting may seem rather crude in method. Thought has been given to a machine for its application.

Looping and Seaming

After knitting, the legs are placed in circular knit cotton tubes, which have been softened, and are delivered to the looping and seaming department in this manner. As it is necessary in this operation to handle each stocking, the most important things to watch are the operator's hands. A full time manicurist is on duty at all times in this department, continually watching the condition of the operators' hands. Hand creams and lotions are helpful to condition the skin, but we have found commercial grade glycerine as good as any hand cream, and very successful in the reduction of snags. Each operator has a bottle at her machine, and

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is instructed to apply this to her hands every 15 or 20 minutes. In the use of any hand cream or glycerine, the danger is that operators neglect to keep their hands thoroughly lubricated at all times, and that as they work their hands become dry. We have experimented with application of a softening oil through a wick attachment on the knitting machine. The nylon thread runs through this wick and picks up oil, which is thereby transferred to the operator's hands. In addition to keeping the operator's hands soft, this system also has a softening effect on the P.V.A. size, so that in drying after pre-boarding it does not become so hard, and does not form sharp edges which would cause small snags in handling before dyeing.

No rings or jewelry are allowed. If operators wear jewelry to work it is checked for safe keeping until the end of the day. All chairs, tables and anything the hose may contact are covered with a smooth nylon fabric. All these precautions, plus close supervision, are necessary in this department.

Pre-Boarding

Our forms are checked daily for rough spots which might cause inside snags. A size build-up may form, and such has been found to cause snagging. For this reason the sizing is washed off the forms periodically, and after washing the forms are again checked for rough spots. Our operators were wearing cotton gloves in this operation, but we found that size buildup on the gloves caused snags. This became costly as an operator would wear out as many as two pairs of gloves per day. The procedure was therefore discontinued and glycerine was used as in the looping and seaming departments. Nylon gloves were tried, but while successful from a wearing and snagging standpoint, they were found very slippery. For this reason production fell off, and they were discontinued.

After the hose are pre-boarded, they are put in trays at the preboarding machine, in a straight flat manner, to cool, then are shaken into dye bags. Checks are made for snags from each operator's work. By this check it is esay to detect faulty boards or careless operators. Again close supervision is necessary.

Dyeing

In this operation, one of the most important things is selection of the proper kind of dye net. We have used various kinds, such as the commonly used muslin bag. We have found that this type does not stand up long, and occasionally will burst during the dyeing operation, causing nearly every stocking to be snagged. We selected a fine double mesh cotton bag, and from various tests have found this ideal for the purpose. The mesh is very fine, which allows for good penetration, and at the same time does not allow any part of the hose to come in contact with metal parts of the machine. Also important is that this type of bag will not float in a paddle machine, as will a muslin bag.

The dye machine should be inspected to make sure there are no sharp objects protruding, large cracks in the corners, or seams in which a bag might become caught and torn. From 4 to 6 R.P.M. is a good machine speed for penetration and level dyeing.

In sampling from the dye bag, it is well to have dye machine operators use rubber gloves to handle the hose; as most operators have rough hands, due to the nature of their work.

After dyeing, the finish should be one which gives maximum snag-resistance, and imparts body and fullness without stiffness. This makes easier handling during mating and packing. After finishing the hose are placed in trucks lined with canvas, or a good grade of paper, and transferred to the extractors, which should be inspected periodically and kept clean. With good dye nets for protection, there is little chance of snagging in this operation.

After extracting the goods are placed in lined trucks. As nylon is non-absorbent, it dries rapidly, and must be covered well to retain as much moisture as possible. We have found a plastic cloth best suited for this purpose.

Finish Boarding

Here again extreme care must be taken that all forms be perfectly smooth and that finish build-up be not allowed to cause inside snags. Again periodic cleaning is necessary. All trays and parts of the machine which the hose might contact should be covered with plastic cloth.

We discontinued use of cotton gloves in this operation, also as much the same faults were found as in pre-boarding. Continual inspection of the operator's hands and the use of glycerine have proved successful.

In brushing down the welts we were using a hair brush, but we found this was causing snags, because hairs would split. The brush was replaced by a quarter-inch felt pad folded over a ½" dowel, which proved very satisfactory. With this too, we found it impossible to snag the welts during finish boarding. After the hose are boarded, the piler lays them out on smooth cardboard trays. These are put on smooth shelf trucks and delivered to the mating and packing departments.

Mating and Packing

In this operation the same care is necessary, conditioning of hands with lotions and no jewelry. All tables should be of smooth, baked, white enamel; racks and chairs covered with nylon fabric; hands closely inspected, etc. These precautions should, if carried out, reduce snagging to a minimum and result in more perfect hosiery.

Discussion

Question: Does Silica Sol reduce snags enough to warrant purchase of additional equipment for its application?

Mr. Olson: The cost of such an operation is nominal in comparison with that of the snags.

Robert H. Smith: In what stages of operation do most snags occur, and how are dye bags scoured and softened?

Mr. Olson: Snags begin with knitting; most occurring in looping and seaming, next in preboarding, involving handling. For cleaning a good grade of laundry soap is best, and any softening agent will do. The bag should be cleaned immediately after emptying, without drying which hardens material on the bag and subsequently causes snagging.

Henry B. Dixon: Have you had experience with 20 denier, 45 gauge, showing new picks as it comes from dyeing?

Mr. Olson: The answer is in laying-out of the hose after pre-boarding. They should be laid out flat and allowed to dry thoroughly before bagging.

Walter T. Sledge: What is the best way of removing a pre-boarded stocking from the form?

Mr. Olson: Have operators grasp the heel and welt and come on up over the form.

J. C. Whitt: How long do the hose remain on the tray before being bagged?

Mr. Olson: One to two hours.

Frank Ferry: To what extent does the laying-out, rather than immediate packing, slow up production?

Mr. Olson: Our chief concern is in reducing snags rather than in speeding production. I believe this procedure worth while in the long run, in reducing snags on hose which otherwise would have to be sold as seconds.

Thomas A. Marlowe: Is anything being done on resin treatment before preboarding, at high curing temperature?

Mr. Olson: Most resins become insoluble and practically impossible to remove, once you have cured them. It is necessary to use a water soluble material which will come off in the dye bath.

Non-Cellulosic Fibers Group Meeting—

LATEST DEVELOPMENTS IN THE DYEING AND FINISHING OF SYNTHETIC FIBERS*

W. G. HELMUS

THE field of dyeing and finishing synthetic fibers is so broad that I doubt if anyone could possibly cover the subject, in major detail, in the time allotted. In this paper, any "man made" fiber will be considered synthetic, despite some contrary theories.

There have been many new plants erected in the past two years with modern and efficient machinery and buildings. The more progressive dyeing and finishing plants are continually scrapping inefficient machinery and processes to keep abreast of the latest developments in the field.

Of course style and color in a fabric are today of prime importance. However, the war has taught everyone there is something of importance in a yard of goods beyond what appears on the surface. The customer wants to know just what he can expect of a garment. Can it be worn in sunlight, or would it be safer for evening wear? Can it be hung in a closet without fear of fading, or must it be sealed in some specially constructed container? Will a raincoat actually shed rain, or will a heavy fog penetrate it? Will a bathing suit withstand the effects of chlorine and salt water? While he is sitting in his car, will his light clothing take on the hue of the upholstery? Will the results of cleaning give his young son a new wardrobe; or after expense of the "new look" for a female member of his family, will a cleaner return the "old look" plus an added blow to the budget?

More thought is given today to final uses of fabrics, and gradual improvement in serviceability is evident. The more conscious we become of end uses, the better will be the quality, and the happier the consumer.

Pretreatments

EMBOSSING.—Embossing is common practice on 100% acetate and acetate combinations. This is accomplished by passing the fabric through a squeeze, comprised of a heated steel roller and a compressed paper or cotton roller, with a design engraved on the steel. This has little or no effect on other types of synthetic yarns.

Nylon can be embossed by raising the temperature considerably higher than for acetates, or by embossing at normal temperatures and curing the fabric, so impressed, at temperatures between 435° F. and 460° F. The effect of this treatment depends on the construction and weight of material treated.

SINGEING.—The modern singeing machine has many advantages over its predecessor. On this newer equipment materials are passed directly through the flame and over refractory surfaces. These machines are run at very high speeds, and turn out better quality than was possible with older equipment.

It was almost impossible, with the old machines, to singe spun acetate or spun nylon without fusing the surface or creating small burned heads. Now practically any weight or density of these same fabrics can be singed without difficulty; it most likely will be closer to the surface than was possible in the past. In using this equipment, one must know his particular machine, and through experience learn the adjustments necessary in speed and flame size to obtain desired results. Quality work is now produced at speeds ranging from 200 to 300 yards per minute, with only fifty percent of the gas capacity in use.

HEAT SETTING.—In the setting of nylon, exact control over speed, temperature, and exposure time is imperative.

Many nylon fabrics are set by heat on the greige goods without scouring; but if they are to be finished in white or light shades, it is necessary to scour first, as the size and other residual matter may become set, making it very difficult to cleanse thoroughly after heat treatment.

The fabric is usually set at temperatures between 435° F. and 460° F., with exposures ranging from 10 to 30 seconds, depending upon weight and density of the material. Installation of a cooling medium is important to this operation, that action of heat may be stopped at a chosen point.

Properly set nylon fabric has better resilience and crease resistance, desirable shrinkage control, improved dimensional stability, increased stretch resistance, and elimination or reduction of tight places from weaving. Setting gives a desirable handle, transforming the rather wet feel of unset fabric into a soft, velvety feel. These attributes are fairly permanent in nature, and are not destroyed by subsequent laundering or ironing. They are produced without weakening the inherent strength of this unusual fiber.

During the war the du Pont Company built a machine to set nylon at these elevated temperatures. Since then at least two other companies have built machines to handle this fabric at increased speeds, with finer temperature control.

GLASS.—The Owens-Corning Fiberglas Corporation has developed a method of heat setting woven glass fabric at temperatures between 1200° F. and 1250° F. They subsequently treat with a silicone type resin, which imparts to the fabric a soft, flexible feel, and seems to relax the fibers, giving them greater abrasion resistance. This also eliminates mark-off, so apparent in the past.

It is believed such treatment will eliminate all objections in the drapery field where most of this material is used.

SCOURING.—To most people scouring is the simple problem of washing out dirt, yet in dyeing and finishing its importance cannot be over-emphasized. As mentioned many times before, it is extremely important to work with clean greige goods. It makes little difference from where the dirt comes. Its presence leads to inferior quality through the need of vigorous pretreatments and extended scouring.

In scouring synthetic fabrics, oils, sizes and soaps must be completely removed, and maximum shrinkage attained, if one would minimize later problems. There are possibly a thousand detergents, alkalies, bleaches, wetting agents and other

* Presented at Non-Cellulosic Fibers Group Meeting, Augusta National Convention, October 22, 1948.

chemicals sold to the textile trade for this purpose, and no doubt all have their places in the field. Many help penetration, allowing the operator to speed up equipment. Others are adept in removing stubborn greases and waxes. Some are used merely to starch. Through research and cooperation between manufacturers and dyehouse chemists, there has been remarkable improvement in stability and digestive powers of well known brands of enzymes.

As mentioned before, the chemicals used must be thoroughly washed out. If this is not done, a residue left in the fabric may cause trouble in dyeing and finishing. As one reads the literature on what this or that product will do, he wonders why there are still problems, and why he must look continually for experienced "trouble shooting" personnel.

Fortunately there are still a few who agree with me, that old fashioned scouring, with a low titer soap and soft water, Zeolite-treated if necessary, has merits which some over-look. This is not meant to infer that plain soap and water will do everything necessary. It is but my contention that this makes a good basic scouring solution, to be supplemented by cures for special ills. The pH of soap has a habit of dropping in continuous machine operations, and it is necessary to remedy this by the addition of mild alkalies.

Outside of the various pretreatments of synthetic fabrics, there is nothing which affects the final appearance of a fabric more than scouring. It might be more accurate to call this the "crepeing" or "shrinkage" operation. In scouring, the appearance of the material is developed, giving the shrinkage and face originally intended by the fabric construction expert.

There are so many ways of scouring that it is practical to mention only a few, and the effect of these on final quality.

Possibly the oldest is the hank or skein method, which gives slow crepeing action with rise in temperature of the bath. The opposite of this is the continuous machine in which goods drop directly into a boiling liquor. This gives fast crepeing action and usually the greatest possible shrinkage. There are numerous modifications of the latter, wherein slides and drums, hot or cold, precede the hot scouring liquor. By proper manipulation it is possible to change the final appearance of the cloth completely at this point and usually shrinkage is also considerable.

Most of the flat qualities, such as taffetas, twills, and satins, are scoured on the dye jig, an operation carried on from beam to beam under tension. This gives the cloth a rather flat appearance, with very little shrinkage. Glass fabric, which has no shrinkage, also is scoured by this method.

Special fabrics such as velvets are usually treated on single or double stars. In this operation the selvages are pinned to a frame, and the goods are either submerged vertically or rotated horizontally in a standing bath. It is always necessary to have the pins adjustable, so that allowance can be made for normal shrinkage.

Rough treatments are not permissible on many of these sensitive yarns. Because of their delicate nature they must be handled with utmost care, on equipment designed to eliminate severe stresses and strains. Their plastic nature gives added opportunity to change the entire appearance of a fabric by variation of machine, time, and temperature.

Without fear of being repetitious, let me say here that there is no substitute for a good washing after scouring. Plenty of soft water to remove residual dirt or chemical will pay dividends in subsequent treatments. This statement is not confined to scouring, but holds true for any chemical treatment, wet scouring, dyeing or finishing. A dyeing and finishing plant which does not have good washing facilities, and soft water to spare, had better look for a new plant site. It will be cheaper in the long run.

Dyeing

The fascinating occupation of dyeing was started thousands of years ago by applying extracts from flowers, trees, berries, shrubs and roots, usually to animal or vegetable fibers. Within the past century or two, the chemist has created dyes and pigments suitable for dyeing anything from oranges to houses. As the colors extracted from shrubs and roots varied in fastness, so also the new coal tar dyes varied in their peculiarities.

One must bear in mind there is no dye made that is fast to everything. However, with proper selection it is possible to apply color that will last almost as long as the fabric to which applied. Nearly every color group, including pigments, is now used commercially on synthetic fibers. Neither the fibers, nor many of the dyes, were known one-hundred years ago.

You have heard much of continuous dyeing ranges which turn out huge yardage of vat dyed fabrics. These, however, do not lend themselves to small lots, which are the rule rather than the exception in the high style field. Millions of yards of synthetic material are still being dyed on the dye beck or jig.

Extreme care and supervision are necessary in the planning of dye formulas and in the application of color. Selection of dye assists, and preparation of the fabric before adding color, vary considerably from one fabric construction to another. Sudden temperature changes, in general, are not conducive to good results. In dyeing acetate fabrics two main problems are fume fading and wash fastness. The azo type blue is still the best known color to use for resistance to fumes; however, this color has very poor light fastness. A new imported color is now available in small quantities. This has extremely good resistance to gases, also light fastness is slightly better than the azo type.

For many years, inhibitors have been applied in finishing operations, but the older inhibitors, in general, reduced light fastness of the color, and were lost completely in one or two dry cleanings. There are now better inhibitors, which do not affect color fastness and better stand both washing and dry cleaning. One must apply just the proper percentage to protect the particular shade or percentage of color in a combination remembering that goods containing 80 percent acetate need considerably more material protection than those containing 30 percent acetate.

For fastness to gas fading, one must consider the particular construction also because some goods expose more acetate on the face than do others.

In reference to wash fastness, though many fabrics today can only be dry cleaned, there is at least one company working on the application of soluble vats to acetate, with preliminary work promising for light and medium shades.

In dyeing nylon, acetate colors were used on most goods during the war and some time thereafter. Some experimental work in New England with chrome colors looked promising, but apparently the operation was too tedious to be practical. A good range of colors developed since then gives exceptional light, wash, and crock fastness on nylon. It is important that dyes on nylon stand up in use as long as the excellent fabric.

Many complaints have been made, from time to time, about unsatisfactory results from color which was supposed to have had extremely good fastness qualifications, and it has been found, on more than one occasion, that the reason for the poor results could be traced to poor application of the color. Time and temperature are extremely important in improving fastness qualifications.

In the hustle of the modern dye plant color is added and a match attained in a very short time. It becomes difficult for a dyer to avoid the common impulse to wash up the lot, when it would be better to run longer, giving the color a chance to penetrate the yarn. Where a final color addition has not been given time to penetrate, you will find on the surface of the fabric considerable color which migrates readily, creating such problems as crocking and bleeding.

Cross dyeing effects have been utilized to a great extent in the past few years, and are being used more and more with solution-dyed and fast-dyed yarns. These yarns are woven into the greige goods, and the dyer subsequently cross dyes one or two colors, giving a pleasant multiple effect. Tinsel also is used in conjunction with synthetic combinations. In the past this was made of brass, bronze, or aluminum foil, which many acids and bases would affect, giving a tarnished appearance. Today the tinsel effect is produced with a cellulosic covering, which gives reasonable protection against handling in wet operations. It should be remembered, however, that acetate colors dye the cellulosic covering.

Finishing

In finishing piece goods various resinous treatments produce all sorts of results, such as soft and firm hands, water repellency, resilience, shrinkage control, abrasion resistance, slip proofing and prevention of seam slippage, porosity variations, and permanent moiré and ciré. Though millions of yards of resin treated materials have been produced commercially, I will mention but a few of the interesting aspects of this development.

The ordinary urea-formaldehyde process, which consists of applying the resin, drying, curing and washing, is now common practice in almost every finishing plant.

The aldehyde process, better known under the trade name of Sanforset, or the glyoxal method of treating viscose rayon, gives definite advantage in shrinkage control. The key points in this process are:

1. Uniform cleanliness and pH of goods to be treated.
2. Accurate timing and control of temperature in the cure.
3. Good control of the tensions involved in final drying and framing operations.

The melamine treatments are usually considered to give wash fastness which is superior to the urea-formaldehyde, but the cost of melamine is somewhat higher.

The Germans developed a new product called Kaurit AF, a glyoxal urea-formaldehyde product, the application of which is considerably easier than that of some other resinous materials. It is practically free from formaldehyde odors and washing is unnecessary. When properly applied, it has extremely good wash fastness. Due to the prohibitive cost of manufacturing the resin, it is not at present a major factor in finishing.

A problem with most resins applied today is the retention of chlorine, particularly on whites where the average laundry finds it necessary to use this bleaching agent. Resins that retain chlorine are detrimental to fabrics because they release acids as they dry, thus lowering the tensile strength and usually giving a yellowish tint to the fabric.

Acetone formaldehyde resin, used with an alkaline catalyst, is one of the few non-chlorine retaining resins which can be used in finishing at present. However, this product has certain other shortcomings, and must be controlled with extreme care to eliminate over-curing, which will yellow the fabric.

Practically every finishing plant now uses cationic and anionic softeners in place of the older finishing oils used in the silk trade in the '20's and early '30's. These softeners are more durable, and not readily removed in the first washing or dry cleaning to which the fabric may be subjected.

Mechanical operations in finishing have not changed much over the years, except for more efficient equipment and accurate controls to speed up production and give more uniform results.

Machinery and Controls

As mentioned earlier, great advances have been made in the development of equipment for dyeing and finishing plants. Although I can not mention all of them, I shall enumerate a few with possibilities in present operation and future development.

The setting equipment, for heat treatment of nylon or glass, has been mentioned before. It is believed such equipment will be used extensively in the next two or three years on all types of nylon and glass fabrics. Most work done on a production basis with nylon has been on knitted hosiery on forms, or on flat woven piece goods; however, progress has been made on knitted nylon piece goods, indicating desirability in the Tricot field.

The high speed singeing machine, using refractory burners, with proper controls for speed and safety, has been tried by many finishing plants and proved satisfactory. It will no doubt be used extensively in the immediate future, until some better method is devised.

Scouring equipment such as the loop type continuous machine, the continuous roll scouring machine, the continuous jig type, and multiple units of the Williams machine have proved that, with few exceptions, any type of fabric can be scoured on continuous machines at minimum expense and maximum efficiency.

The new Tensitrol equipment, developed by the Rodney Hunt Machine Company, is supposed to reduce tension, thereby making it possible to wash or dye material flat or in rope form continuously. This machine is a new development which seems to have good possibilities for the future.

Various temperature and cycle controls are now available for all types of wet treatment, so it is possible to set up a standard formula and repeat the identical cycle at will. Almost every manufacturer of open dye becks has, today, a completely enclosed type which economizes steam and attains higher temperatures than possible in open machines. Open dye jigs can be, and are being covered, although not many machine manufacturers have totally enclosed jigs in their line. For high temperature dyeing these do an excellent job.

A new type of suction drum is available which reduces tension during this operation. Goods no longer have to be pulled over a slotted or perforated suction pipe, but are driven over a perforated pipe, which in itself is the drive roller.

High speed loopers serve where the old type eccentric cam looper would be impractical, because the terrific speed would shake it apart.

To the conventional extractor controls have been added, for speed of basket, safety of operation, and automatic timing.

Modern dyeing and finishing padders and calenders, with pneumatic and hydraulic controls, have helped dyer and finisher to reproduce a given quality consistently.

The increased efficiency of drying equipment and totally enclosed frames has been stepped up tremendously in recent years. Work now in process by makers of automatic moisture controllers will no doubt surpass anything done before.

The high speed automatic frame opener produced in this country under English patents has proved extremely satisfactory. This equipment was designed for pin frame operations, but with slight changes has become extremely useful on clip frames.

The over-fed pin frame is a new development. Although there are not yet many machines operating in our country, it looks as though it will become more widely used. It has advantages in controlling shrinkage without depending on the human element.

Modern auxiliary equipment such as sewing machines, examining tables, doubling and tubing machines, increase efficiency and accuracy in volume production.

It is believed that the last four or five years have seen greatest improvement in the textile dyeing and finishing equipment field than in the previous twenty or thirty years.

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Non-Cellulosic Fibers Group Meeting—

CONSUMER COMPLAINTS FROM NEW FABRICS AND FINISHES*

LEE G. JOHNSTON

American Institute of Laundering, Joliet, Illinois

I WELCOME the opportunity of meeting with this group, for though it sometimes appears that the laundry industry is on the opposite side of the fence from the textile industry, we really work for the same customer. In fact the laundry industry is often called the maintenance branch of the textile industry. I want to urge ever closer cooperation between production and maintenance. It is your job to produce fabrics with colors, finishes nd styles to suit the consumer, and it is the laundry's job to recondition these fabrics after soiling has made them temporarily unfit for use. Both groups are serving the same customer, and gentlemen, the customer is *boss.*

The laundry is closer to the boss than is dyer, finisher or mill operator, and gets quicker reaction to dissatisfaction, but if you yourselves put out a fabric with unappealing color or unsatisfactory finish, just as surely will somebody take a loss on it, because the *boss* won't buy it. Producer and reconditioner must work to keep the consumer happy. To be effective we must cooperate.

To illustrate the need of cooperation I might tell a story even at risk of its being old to you. I asked the toastmaster of our last year's banquet to lend me his Irish dialect but he thought he might need it. So you will have to take it straight.

Mike and friend Pat were riding a tandem bicycle when they came to a steep hill. As they reached the top Mike, out of breath and weary said, "Pat, that was a steep one. I was afraid we wouldn't make it."

Said Pat, "It was that. We'd have rolled back if I hadn't kept my foot on the brake." This kind of cooperation we don't want.

This meeting gives me opportunity to present some problems with fabrics and finishes which produce consumer complaints. Knowing their existence you may be able to overcome them, and help us to make a happier consumer.

Laundry operators get many complaints, of which some are justified and some are due to the customer's own error. Some, however, are attributable to a defect in the article which makes it non-launderable. It is of this group that I would talk today. I am not speaking as a preacher to condemn you for your sins, but rather to show you the other side of the picture.

The AIL is in a position to learn of these complaints because one of the services offered to laundries in our association is what might be called a referee service. Our laboratories will examine any fabric or garment which has caused complaint and report to the laundry the cause. Thus we get all types of complaint from many parts of this country, and some from Europe, South Africa, Australia and New Zealand. In 1948 we shall have received 3,500 packages of complaint-causing articles, many holding several problems.

Of these 3,500 about a third will involve complaints arising from faulty manufacturing; shrinkage, damage from poor sewing, gas fading, chlorine retention, poor color fastness.

Shrinkage now seems the source of more complaints than previously. It is not known whether this comes from decrease in quantity of preshrunk fabric produced, or increase in consumer knowledge that shrinkage can be overcome. What the consumer in general doesn't know, is that shrinkage characteristics of cellulosic woven fabrics are determined by fabric treatment in manufacturing and finishing. Many still blame the laundry if a shirt shrinks from loose fit to choking the first time laundered. We haven't been able to educate the consumer to the fact that a cotton fabric with inherent tendency to shrink when washed, is going to shrink regardless of *how* washed. The laundry operator does know this, and will refuse to pay claims on shrinkage. Occasionally the laundry does pay one of these claims, making a so called policy settlement with the attitude, "It's not my fault but this is a good customer." More often it will refer the customer to the retailer. The retailer does have a responsibility to the purchaser. If a garment which may require washing is sold as of a given size, it should hold that size after washing. Sale at a given measurement implies that the article will maintain that measurement, within reasonable limits, through the normal use and washing of its serviceable life.

I have been speaking of general, overall shrinkage. That is only one of the shrinkage complaints which your customer brings to the laundry.

When asked what thoughts they would convey to those responsible for production of the fabrics they are handling, laundrymen said, "Tell them about shrinkage." They said be sure to mention localized shrinkage, as when towels with corded borders are washed. You know the problem. Towels with specially woven border or stripe containing yarns of different shrinkage properties, shrink in washing so the stripe becomes a tight band. The towel achieves that hour glass figure desirable in the lady consumer but quite unsightly in the towel. Because this shrinkage takes place in washing, the customer unjustly asks the laundry to replace the towel. The same complaint applies to some few other articles of novelty weave, such as fancy tablecloths and curtains.

"Tell them," said the laundryowner, "about the Vinyon problem." That came from improper choice of fabric for a given end use, probably a minor group in the classification of complaints. I recall a knit "T" shirt made of Vinyon. Being white, it was washed with white wearing apparel and finished by tumbling. The temperature near the end of drying was around 200° F.

The garment shrank from a size 40 to that suitable for a small doll. This of course was due to poor judgment in the cutter up, with no reflection on the fiber. It is generally understood that the manufacturer of this fiber tries to maintain control over end use, to keep it from unsuitable uses.

"Bring to their attention," said the laundryowners, "the difficulties we now have with collars." I realize my audience has few members involved in the design

* Presented at Non-Cellulosic Fibers Group Meeting, Augusta National Convention, October 22, 1948.

and marketing of shirts, but let me say just a word about the stay pocket collar. Shirts with this type of collar are handled just as others, in laundering, and are starched or not starched at the *customer's* request. It so happens that the stay pocket collar construction does not lend itself well to a starched finish. If the collar be starched, sewing thread forming the stay pocket makes objectionable glazed marks. To prevent this the laundry could omit starch. But the owner may object, wanting a starched collar. Obviously this shirt is made to be used with soft collar, and should be sold only to a consumer who asks for a soft collar. Apparently what is needed in this instance is consumer education and sales personnel instruction. There has been considerable discussion about this collar, and shirt collar shrinkage in general. In one of the trade papers there was an article on shirt finishing in which laundries were held responsible for collar shrinkage. It was stated that tumbling of shirts was the cause of excessive shrinkage. I would like to correct that false impression.

Tumbling is a drying operation. Garments are placed in a perforated revolving cylinder which lifts and drops them so they float to the botton on a current of previously heated air. There is involved a certain flexing of yarns and relaxation of tension so that stretched fabrics may be expected to shrink. But this type of drying is used for towels, knit underwear and other soft items, and is not a part of shirt finishing routine. So tumbling is not responsible for shirt collar shrinkage.

"Tell them," the laundrymen said, "about the damage from vat dyes."

Remember I am not giving you "don't's." I will not say "don't use vats." I am merely pointing out problems presented by some textile products and giving you a look at the other side of the picture, the side the laundry and the consumer see.

The laundry industry appreciates vat dyes because they decrease the danger of bleeding colors; but there are problems with vat dyes which unjustifiably bring upon the laundry the wrath of the housewife. Some vat prints weaken a fabric as it is used. In garments sent to the laboratory areas printed with vat dyes, have been so weak that a finger could easily be pushed through. Other areas, white or other colors, would be strong. In some cases the garments have been new, in others damage has developed only after long service. This shows up occasionally regardless of whether items are washed at home or in a laundry. We have been unable to trace the difficulty to any specific dye since many have shown the weakening effect, and the same dyes do not always react this way.

Similar is the effect sometimes noticed when vat printed curtains or drapes are exposed to sunlight. Often individual colors in a pattern will so weaken the fabric that mild washing or dry cleaning will cause breaks. Since the breaks appeared in washing, or at least in the laundry, the customer thinks some laundering process responsible for the damage. Usually the laundry can give an explanation satisfactory to the customer, but at times it has taken a court decision to convince a consumer that holes in but the yellow or orange spots came not from improper laundering.

"Tell them" said another laundryman, "about fast colors that lose depth of shade on washing."

What he referred to were vat prints on tablecloths or napkins, sold as vat dye prints which all the public has come to expect of such fabrics. When washed they may lose nearly 50% of their depth. Bright borders or insignia on many commercial linens react this way, because the good vat dyes are printed on the surface and friction in washing rubs them off. By keeping the print on the surface you do get better color value and more mileage from your vat dyes, but you produce an inferior product. "But is the friction necessary in washing?" you ask. YES. Following the reports of our research committee on color fastness to washing you will recall that much of its work has been toward increasing friction in washing tests. You can wet two fabrics in a detergent solution and get a comparison of color bleeding for two dyes, but if there be no mechanical action or friction, you can not duplicate any reasonable type of cotton washing. What is *more important*, you would remove little soil, if soil were present. What we need is a print to stay on a fabric washed for removal of *soil*, not just a print to withstand soaping for removal of soluble parts of printing paste.

"Tell them," the laundry operators said, "of the problems in resin treated fabrics."

These first arose in the late 1930's as many of you recall better than I. Recently, with general interest in plastics and resins, there has been a demand for resins in the treatment of fabrics.

There is of course increasing use of resin treatments for producing shrink resistant wools. These, it would seem, have helped fill an actual need. The consumer wants wool that can be washed at home without felting or shrinkage. The laundries as service organizations, washing woolens for the *consumer*, also welcome this improvement.

Rayons and lightweight cottons are being treated with resins to give crease resistance and body. Sometimes this too means a welcome advance in quality. But resins with chlorine retentive properties on white rayon or cotton, are not welcomed by the consumer washing these items at home, or by the laundry. In washing white cottons it is necessary to use a small amount of chlorine bleach to maintain whiteness of fiber and remove stains. This is not always used on rayons, though it may be necessary to use bleach occasionally for stain removal. Certain resins absorb chlorine from this bleaching treatment and hold it regardless of rinsing. Yellowing, fabric damage, or both may result, depending upon the resin involved.

Apparently the more bleach used the greater the discoloration. This is serious for the laundry, but worse for the housewife washing at home. Her quantity of bleach as of other supplies, is less carefully controlled, and discoloration therefore may be greater. The laundry member of our association can send such items to our laboratory for explanation, but the housewife is stuck with the problem. She has been washing shirts for years without trouble and when this color develops she immediately suspects there is something wrong with the fabric. We have received white shirts with this yellow discoloration from laundries which had in turn received them from a housewife who washed them at home.

This problem has become increasingly important in the last year, not only in lightweight or pique shirts, but in dresses, curtains and various other garments and fabrics.

While I am not specifically representing the Certified Washable Seal Program of the American Institute of Laundering, I can assure you their department would be glad to work with you in any pre-testing program. Thousands of dollars may be saved and goodwill retained by such a program, which eliminates costly returns of items found not launderable.

I have brought to your attention various problems arising from the decisions which you gentlemen make. A pre-testing program would have obviated these problems. The laundry industry asks that you give it consideration when you make decisions on production methods, dyes and finishes, and as Mike might have said to his friend, on the next hill, "Please keep your foot off that brake."

Discussion

Question: Would a colored gingham finished with chlorine retentive resin be likely to cause complaints because of chlorine retention?

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General Technical Meeting—
Cotton Symposium—

MODERN TRENDS IN PIECE-GOODS PREPARATION, DYEING AND FINISHING*

C. NORRIS RABOLD
The Erwin Cotton Mills Company

WHAT we think is the most important trend that has taken place in the piece-goods industry over recent years is neither mechanical nor chemical. This major trend is the general and wholehearted adoption by the industry of technically trained personnel and scientific operating methods. It is with considerable interest that we note the tremendous increase in the number of chemists and engineers who are taking their place in the textile field. Such technical personnel are devoting their activities to inventions and improvements in dyes and chemicals, new machine designs, improved electrical drives, and better instrumentation. Application techniques are also rapidly becoming better understood and carried out with increased "know-how."

Continuous Processing

Continuous processing methods in bleaching, dyeing and finishing constitute a second major trend.

BLEACHING.—About a decade ago, the first continuous peroxide bleaching range for cotton goods was installed in a finishing plant, but today we have several bleaching systems for both rope and open-width preparation.

Early ranges were originally planned to produce bleached whites on light-weight cottons in the rope form, but it was not considered possible to run heavy fabrics, combed yarn materials or goods intended for dyeing. Modern ranges will bleach whites and prepare goods for dyeing economically and rapidly.

Rope range speeds of 250-300 YPM, even for medium and heavy-weight goods are now taken as a matter of course. It is obvious that engineers have spent a lot of time on machine design and materials of construction to make this possible.

Electrical engineers with D.C. soft motor drives, operating from individual motor generator sets, have solved the problem of running the various bleach range units in synchronism at these high speeds. Such drives also serve to make possible the high speed dyeing and finishing ranges of today.

WASHING.—Until recently, washing of goods had not been given the attention this operation deserves. In the operation of continuous bleach ranges, it was found that efficient washing was a "must", particularly after the caustic steaming stage. At this point, it must be remembered we have done little to remove the natural impurities from the cloth but have only carried out such reactions as to put them in a removable condition. We have softened and swollen the various pectins, proteins and starches, saponified and partially emulsified the fats and waxes present and broken open motes. Early practice was to run the goods in a tight strand washer with cold water. The cold water promptly tended to congeal the whole mass of impurities, rendering their removal difficult. Since cold water is also a rather poor means of removing caustic soda, excess quantities of both the natural impurities and caustic were often carried into the peroxide saturator. This meant an increased peroxide demand, as well as an unstable, and at times, uncontrollable saturator bath, so that the bleach could be costly and non-uniform.

We have today several new washers which are definite advances in this field. All of these washers use hot water, and in addition, try to get as much mechanical agitation as possible, so as to force the wash water through the cloth, whether it be in rope or open-width form.

One washer is a tight strand type with three compartments and counter-flow of water. Hot water enters at the delivery end of the washer which is equipped with open-slatted stainless steel reels, top and bottom. The bottom reels create considerable turbulence, thus forcing the water through the cloth.

We are all familiar with the Williams unit as a washer for open-width goods. Here the cloth passes through hot water in narrow slots. The speed of the cloth in this confined space also causes considerable turbulence, so that the wash liquor is forced through the fabric.

The Tensitrol washer uses hot water and has the bottom rolls driven so that the cloth is slack while in the wash water. This condition causes agitation and since the cloth is in a relaxed condition, there is a high transfer of water through the goods, whether in rope or open width form.

Needle sprays with high pressure, forcing the wash-water through a fabric are also being used on open-width washers. A new washer, in which the cloth is carried through tubes at high speeds is under experiment. In another type, also under development, the cloth passes in open width between two perforated plates of small areas. Hot water is forced through the openings in the top plate, and is pulled through the cloth on the bottom, vacuum side, by means of a pump.

The use of high temperatures and the reduction in the water to cloth ratio is a most important trend in this phase of processing. Whether a washer uses 25 GPM or 75 GPM is not necessarily the whole answer as to its efficiency. The question is, what is the number of gallons of water used per pound of cloth, in terms of percent removal of chemicals or impurities? Some washers today use as little as one gallon of water per pound cloth, with a higher efficiency rating, than 3 or 4 gallons on older types.

DYEING.—In dyeing, we find continuous methods of color application are definitely the trend. Formerly a limitation in applying vat colors continuously was depth of shade. Medium and heavy shades

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could not be made by continuous reduced methods, employing low temperatures, due primarily to short booster time. The size of boosters was increased with a resulting heavier shade, but also a higher chemical cost, and with some dye combinations, an undesirable surface dyeing effect as well as poor fastness and color yield.

The first advance in this procedure was padding the color on in pigment form and drying. When the goods entered the booster, there was far less wash-off and surface dyeing, along with improved fastness. Also, medium and heavy shades were made possible. However, short commercial runs of several thousand yards is not too practical for the big booster ranges, both because of chemical cost and loss of time in changing shades.

Two developments in color application, the pad-steam method and the Williams unit, appeared almost simultaneously. Their unique feature is the high temperature fixation of dyes in a matter of seconds, either in a steam atmosphere or short-volume chemical bath. All types of colors, such as directs, sulfurs, vats and naphthols can be applied on these ranges when properly designed. However, for small lots and certain shades, jig application of dyes is still in favor and will be for a long time.

FINISHING.—In this field, the trend also has been towards range hook-ups and higher speeds. This means drying machines such as tenters, cans, loop and lay dryers and curing equipment for resins and water-repellents, must be built with greater precision and made of metals that will stand high speeds and high temperatures as well as corrosive chemicals. Synchronism of units is most necessary and D.C. variable voltage drives aid materially in finishing range operation.

Dry can ranges now operate at pressures of 35 to 50 lbs., with cans made of stainless steel. Air dryers are made with compact housings designed to keep heat losses to a minimum. Air circulation systems have been redesigned so that the "dead air" layer next to the wet cloth can be moved away more readily.

Both direct and indirect gas or oil-fired dryers are meeting with increasing favor in the drying field, especially on cotton goods. The same can be said of the "burner" type of heater, often used as a booster on existing equipment.

In the chemical end, the increased interest in resins for the stabilization and crush-proofing of cotton fabrics is a distinct trend. Various other resin types are meeting favor in finishing, because of such properties as resistance to laundrying, clarity of film and ability to improve "body or hand".

Controls and Instrumentation

It is needless to say that controls and instrumentation constitute a major trend in our industry and without them, it would be difficult, if not impossible, to operate our continuous range set-ups efficiently.

BLEACHING.—On both the caustic soda and peroxide saturators, maintenance of level and temperature is important for uniform impregnation. Caustic baths are generally run hot (180-200° F.). This high temperature aids the impregnation of the goods and entering the cloth hot into the steaming section saves both time and steam there. On the bleaching end, it is undesirable to heat the peroxide bath much over 120°-130° F., due to excessive peroxide decomposition; therefore, the entering cloth temperature must not be too high. Recording temperature and level controllers aid in maintaining proper conditions.

Loading of saturator and washer nips should and can be accurately controlled. This has been made possible by the positive air-set and spring-set loading of nips, permitting varying degrees of pressure to be applied as desired. For example, in caustic steaming, best results are obtained when the goods enter the steamer with a 90-100% wet pick-up. On the peroxide end, much lower pick-ups, 50-60%, seem to give better results. The highest possible expression of water is always desirable before entering a saturator and when leaving the range on to the drying equipment. Load indicators help the operator to control moisture content uniformly.

Steam pressure, steam flow and maintenance of a uniform temperature in the steaming units are very necessary. These conditions can be attained by pressure regulating valves, recording steam flow meters and temperature regulating controllers, all synchronized together. Such controls afford uniformity as regards heat distribution and also may reduce the amount of steam consumed by a considerable amount.

The saturator baths require extremely careful control of chemical concentrations and balances. There is a definite trend towards feeding concentrated chemicals independently rather than from mixing tanks. Thus, the operator can adjust the concentration of each chemical as desired, and make changes on the run as needed. Rotameters, measuring and proportioning pumps play the leading role in such systems. The whole operation is checked by frequent chemical analysis of the baths, so that any variations can be quickly detected.

DYEING.—Modern, high-speed dyeing ranges, such as the pad-steam and high-temperature, short-volume boosters, present a number of control problems. With vat colors on both systems, the pigment is padded on and dried before reduction. A controller regulating the temperature in the drier so that the goods leave with a uniform moisture content should prove useful.

In the pad-steam system, the pigmented cloth is saturated with a caustic soda and hydrosulfite solution in a pad before steaming. Temperature and level controls are desirable here, to prevent hydro decomposition and excessive bleeding of color in the pad, and to insure uniform saturation. Titrations should frequently be made for both caustic and hydro concentration, and independent feeding of chemicals is desirable. In the steam chamber, even though very low pressure steam is needed, steam flow valves and pressure reduction valves, actuated by a recording temperature controller, should do much to prevent fluctuations that could produce shade variations.

When the high-temperature, short-volume booster, such as the Williams unit, is used for reduction, temperature controls are definitely needed, as well as individual chemical feeds for water, caustic soda and sodium hydrosulfite. Level is important for uniform shading and can be held by means of a constant overflow or level controller. Frequent titration of the booster is a "must." Inasmuch as a rather high percentage of the shade is developed in the booster and color on the entering cloth is washed off and dyed on again, control samples should be taken from the booster and quick dyeings made to check for any variation.

FINISHING.—To some extent, this field has been neglected in controls and instrumentation, both because of the wide variety of machines used and the rather prevalent belief that few controls were necessary. The advent of durable water repellent and resin finishes rapidly changed this thought. Both finishes require rather precise make-up and application temperatures as well as means for indirectly heating or cooling mixes in tank and mangle, so that constant temperatures can be held. Time-temperature relationships in drying and curing are also most important for satisfactory results.

Tension, or rather lack of it, plays a leading part in both cotton and rayon processes, and a number of finishing ranges today use photo cells to synchronize the various units and keep goods slack at points where compensators, reels, etc., would stretch or distort them unduly.

(Concluded on Page P77)

Intersectional Contest—

SOME CONDITIONS AFFECTING THE APPLICATION OF VAT COLORS*

Presented by

THE RHODE ISLAND SECTION

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Abstract

The objective of this investigation was to determine why certain vat colors produce satisfactory results in dyeing but generally poor results when used in printing. The study included a general consideration of both dyeing and printing with vat colors. Since printing is fundamentally localized dyeing (pad-steam process analogous to printing), an examination of the effects of various factors upon dyeing should give indications as to how these same factors would affect printing.

The variables selected for study included the following: (1) Dispersion of pigment particles and particle size; (2) Substantivity of the leuco compound; (3) Reduction of the vat color; (4) Solubility of the leuco compound; and (5) Molecular weight. Six colors satisfactory for printing, four colors classified as fair and six unsatisfactory printing colors were used to study these variables.

In the case of (1) it is known that by decreasing the particle size better color yields are obtained in printing and dyeing by any of the several methods now in practical use. (2) Data from dyeings made by the reduced method, which means that the amount of color on the material would depend on the affinity of the leuco compound for the fiber and from spectrophotometric measurements, are given which show that with amounts of color up to 20 percent of the weight of the material the leuco compound had affinity for the fiber (as much as would be used in printing a heavy shade). The substantivity of the leuco compound of the vat colors examined was such that satisfactory exhaustion in dyeing and printing was obtained throughout the working range of dyestuff concentration under proper conditions of moisture, alkalinity, and reducing agent. (3) The sixteen colors were studied to determine the ease of reduction by a variation of pH and using hydrosulfite ($Na_2S_2O_4$) and sulfoxylate ($NaHSO_2.CH_2O.2H_2O$) as the reducing agents. With hydrosulfite, when only soda ash was used, many of the colors gave for all practical purposes, no yield. When the reducing agent was changed to sulfoxylate, the color yield decreased. In general, the yield followed the same pattern as in the case of hydrosulfite with an increasing amount of soda ash. (4) No relation was found between solubility and printability. The solubility of the leuco compound of the vat colors studied was generally satisfactory under proper conditions of chemicals, reducing agent, solvents and moisture. (5) The molecular weight of the vat colors had little effect upon their behavior in dyeing or printing.

Moisture was found to be an important factor. Complete reduction and solubility could be affected in various media, but the proper amount of moisture was necessary in order to obtain satisfactory dyeing or printing. The type of alkali, such as carbonate or hydroxide, gave widely varying results with different dyestuffs. The concentration of alkali necessary to affect reduction of dyeing was relatively small. As the concentration increased over this minimum, the color yield diminished rapidly. The results obtained with varying concentrations of alkalies appeared to have significant practical values. The ease of reduction varied widely from color to color under equal conditions of time, temperature and chemicals. Temperature affected the rate of reduction and exhaustion in dyeing. In the ageing of prints, the temperature determined the relative humidity and moisture absorbed, which influences the color yield. With glycerine and a solvent medium, the temperature affected the color yield of certain vat dyestuffs. Hygroscopic agents or solvents materially affected the results in printing. The experimental procedures described provide new and unique methods for evaluating such agents.

The general conclusion may be stated that if the optimum conditions for each color are obtained, most vat colors are suitable for both dyeing and printing. It is not commercially practical at the present time to print certain vat colors because of the effect produced by one or more of the variables studied. The colors most satisfactory for printing are those which show the least variation in results under all conditions.

THE objective of this investigation was to determine why certain vat colors produce satisfactory results in dyeing but generally unsatisfactory results when used in printing. For example, it is known that colors such as Ciba Blue 2BDG, Ponsol Jade Green and Ciba Brown G are excellent printing colors, whereas Indanthrene Rubine RA, Ponsol Khaki 2G or Ponsol Brown AR cannot be successfully printed, particularly in heavy shades. Various reasons are given for the fact that some colors cannot be printed, and the list of unsatisfactory printing colors varies from one plant to another. From the standpoint of benefit to the industry, it was believed that it would be profitable to make a study of the reasons why some colors print satisfactorily and, conversely, why some colors are unsatisfactory, even though it might not be possible to find a material which, if incorporated into the print paste, would make all colors give satisfactory color yield under all plant conditions.

Since printing is fundamentally localized dyeing, it was believed that an ex-

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amination of the effect of various factors upon dyeings might give indications as to how these same factors would affect printing. This appeared to be particularly true in dyeing by the pad-steam process which is analogous to printing. As the investigation progressed it became apparent that certain factors materially influenced the results in both printing and dyeing, and accordingly, the study was broadened to include a general consideration of both dyeing and printing with vat colors.

Factors which might possibly affect the results were listed and experiments planned and conducted in which one factor at a time was varied, while all others remained constant. In evaluating the depth of shades produced under varying conditions, relative strengths were calculated from spectrophotometric curves, so that numerical results could be reported. Due to the conditions under which the tests were conducted there was an unevenness on some patches, in which case spectrophotometric values were measured at several places, and the results averaged. Therefore, the relative strengths reported are not always precise values, but indicate the general effect, and, we believe, are a more satisfactory expression of the variations observed, than a verbal description.

A simple experiment showed that some colors gave a better color yield when developed by the vat ageing process used in printing than when dyed, while others gave a poor color yield under the same conditions. The following colors were prepared in 5 per cent strength, using a thin potash, sulfoxylate (sodium sulfoxylate formaldehyde $NaHSO_2.CH_2O.2H_2O$) vat printing paste: Ciba Blue 2BDG, Carbanthrene Blue BCF, Indanthrene Olive RA, and Ponsol Brown AR. These mixtures were padded and dried. One-half of each patch was vat aged and developed in the usual manner. The other half was jigged, using sodium hydroxide and sodium hydrosulfite ($Na_2S_2O_4$). Estimated yields, based on the jigged patches as 100, were as follows:

	Dyed	*Vat Aged*
Ciba Blue 2BDG	100	160
Carbanthrene Blue BCF	100	60
Indanthrene Olive RA	100	40
Ponsol Brown AR ...	100	30

It was obvious that only one of the four dyes could be considered a satisfactory printing color.

The factors selected for consideration were:

1. Dispersion of pigment particles and particle size.
2. Substantivity of the leuco compound.
3. Reduction of the vat color.
4. Solubility of the leuco compound.
5. Molecular weight.

In studying these factors, dyes, generally classified as follows, were used:

Satisfactory printing colors.

Ponsol Brilliant Violet 4RN
Ponsol Golden Orange RRT
Sulfanthrene Pink FF
Ciba Blue 2BDG
Ponsol Jade Green
Ciba Brown G

Fair printing colors.

Indanthrene Golden Orange 3G
Calcosol Red BN
Ponsol Violet BN
Indanthrene Brown BRA

Poor printing colors.

Indanthrene Olive RA
Indanthrene Rubine RA
Ponsol Khaki 2G
Carbanthrene Blue BCF
Ponsol Violet AR
Ponsol Brown AR

1. A review of the literature indicated that it has been established that the dispersion of the pigment particles and the particle size has a considerable influence upon both dyeing and printing. *(1).* It is well known that by decreasing the particle size more satisfactory color yields have been obtained in printing and dyeing by any of the several methods now in practical use. The dyestuff manufacturers have been aware of this effect and have continually improved the methods of production. In this investigation it was assumed that the vat colors used were of the optimum particle size and dispersion.

2. In order to determine whether lack of affinity of the leuco compound caused certain colors to give unsatisfactory results in printing, tests were made with two colors, ordinarily considered to be unsatisfactory for printing, especially in heavy shades. These colors were Indanthrene Rubine RA and Indanthrene Brown BRA. Dyeings were made by the reduced method, whereby the amount of color on the yarn would depend upon the affinity of the leuco compound for the fiber. The amounts of the dyestuffs used varied from 2.5 to 20 per cent based on the weight of the yarn dyed. After dyeing, the yarn was oxidized in the air, rinsed in cold water, soaped at 200° F. for 15 minutes, rinsed and dried. The amount of dyestuff not taken up by the yarn was determined photometrically as follows:

(a) Color remaining in the dye bath.
(b) Color in the wash waters (with Indanthrene Brown BRA the color was too dilute to measure).
(c) Color in the soap bath.

Adding these values together and subtracting the total from the amount of color applied gave the amount of color on the yarn. The depth of shade on the yarn was then determined spectrophotometrically and found to be practically the same as predicted by determining the amount of color not taken up by the yarn. The data on these tests are given in Tables I, II, III and IV.

From Table I the amount of dye present on each skein may be calculated. From these data the relative strengths of the samples may be predicted. These data and the actual strengths obtained by measuring the samples on the spectrophotometer are given in Table II.

The data for Indanthrene Rubine RA are given in Table III.

From these data the amount of dye present on each skein may be calculated. The relative strengths of the samples may then be predicted. The theoretical strengths may be postulated from the amount of dye added. These data and the actual strengths obtained by measuring the samples (the last two were too concentrated)

TABLE I

Indanthrene Brown BRA Paste—Exhaust Measurements. Dye Remaining in Exhausts and Soap Baths.

Percent Dyeing	*Dye in Exhaust Bath (mg.)*	*Dye in Soap Bath (mg.)*	*Total Dye Not on Skein (mg.)*
5	64.9	31.5	96.4
10	171.5	33.1	204.6
15	306.5	48.9	355.4
20	394.0	56.8	450.8

TABLE II

Dye on Skeins and Relative Dyed Skein Strengths.

Percent Dyeing	*Dye on Skein (mg.)*	*Predicted Strengths (%)**	*Measured Strengths (%)***	*Percent Difference Between Measured and Predicted Strengths*
5	403.6	(100)	(100)	(0)
10	795.4	197	193	—4
15	1144.6	285	268	—6
20	1549.2	385	388	+1

* Predicted from "dye on skein".
** Measured at 590 mu.

TABLE III

Indanthrene Rubine RA—Exhaust Measurements
Dye Remaining in Exhausts, Wash Waters and Soap Baths

Percent Dyeing	Dye in Exhaust Bath (mg.)	Dye in Wash Waters (mg.)	Dye in Soap Bath (mg.)	Total Dye Not on Skein (mg.)
2.5	9.3	—	9.5	18.8
5.0	25.6	—	10.4	36.0
7.5	47.4	3.1	10.8	61.3
10.0	68.6	5.4	13.7	87.7
15.0	130.8	8.8	13.7	153.3
20.0	224.0	10.2	14.4	248.6

TABLE IV

Predicted, Theoretical and Measured Strengths of Dyed Skeins.

Percent Dyeing	I Dye on Skeins (mg.)	II Predicted Strengths (%)	III Theoretical Strengths (%)	Percent Difference Between Theoretical and Predicted Strengths	IV Measured Strengths (%)	Percent Difference Between Measured and Predicted Strengths
2.5	231.2	(100)	(100)	(0)	(100)	(0)
5.0	464.0	200	200	0	216	—7.5
7.5	688.7	297	300	—1	320	—7
10.0	912.3	394	400	—1.5	410	—4
15.0	1346.7	583	600	—3	—	—
20.0	1751.4	758	800	—5	—	—

I Calculated from Table III.
II Calculated from Table II.
III Calculated from dye added.
IV Measured at 425 mu. These mesaurements are affected by shade.

TABLE V

Comparative Strengths of Beaker Dyeings as Follows:

Cloth Sample—10 grams.
Liquor ratio 30:1=300 ml.
Temperature 120° F.—140° F.
Time ¼ hour.
Dyed reduced.
10% Vat Paste.
2.5 grams Hydrosulfite.
Alkali as indicated.

	2.5 g NaOH	1.8 g NaOH 1.6 g Na_2CO_3	1.25 g NaOH 3.3 g Na_2CO_3	0.6 g NaOH 5.0 g Na_2CO_3	6.6 g Na_2CO_3
Indanthrene Golden Orange 3GA	100	106	130	153	54
Ponsol Golden Orange RRT	100	86	113	97	14
Ponsol Brown AR	100	117	151	177	80
Indanthrene Brown BRA	100	129	159	189	44
Ponsol Khaki 2G	100	108	109	81	13
Calcosol Red BN	100	103	152	200	211
Sulfanthrene Pink FF	100	102	98	73	58
Indanthrene Rubine RA	100	105	107	61	6
Ponsol Violet BN	100	103	114	98	125
Ciba Blue 2BDG	100	108	131	141	141
Carbanthrene Blue BCF	100	115	104	38	6
Ponsol Jade Green	100	96	99	112	66
Ponsol Violet AR	100	147	210	240	231

TABLE VI

Comparative strengths of beaker dyeings with identical conditions as in Table V except 2.5 grams of Sulfoxylate were used instead of 2.5 grams of Hydrosulfite and temperature was 200° F.

	2.5 g NaOH	1.8 g NaOH 1.6 g Na_2CO_3	1.25 g NaOH 3.3 g Na_2CO_3	0.6 g NaOH 5.0 g Na_2CO_3	6.6 g Na_2CO_3
Indanthrene Golden Orange 3GA	28	27	31	17	9
Ponsol Golden Orange RRT	81	80	56	36	11
Ponsol Brown AR	33	38	44	37	5
Indanthrene Brown BRA	23	24	13	5	3
Ponsol Khaki 2G	20	23	20	15	10
Calcosol Red BN	50	60	69	90	88
Sulfanthrene Pink FF	54	66	90	64	35
Indanthrene Rubine RA	15	15	12	6	4
Ponsol Violet BN	56	62	67	85	83
Ciba Blue 2BDG	52	56	72	88	88
Carbanthrene Blue BCF	26	34	41	26	22
Ponsol Jade Green	50	49	52	53	25
Ponsol Violet AR	102	106	149	112	105

on the spectrophotometer are given in Table IV.

From these results it is seen that with amounts of color up to 20 per cent of the weight of the material (as much as would be used in printing a heavy shade), the leuco compound has affinity for the fiber.

It was believed that one of the reasons for poor printing properties of some of these colors was their lack of substantivity at the high temperatures encountered during vat ageing. Many of the unprintable colors are now dyed with good color yield by the pad-steam method. This investigation showed that satisfactory yields on unprintables were obtained by printing the pigment colors and then padding with sodium hydrosulfite and caustic soda and steaming. Therefore, some factor other than substantivity is responsible for the poor yield obtained in printing some vat colors.

3. The 16 colors were studied to determine the ease of reduction by a variation of pH and using hydrosulfite and sulfoxylate as the reducing agents. The results of these studies are given in Tables V, VI, VII and VIII.

Tables V and VI present data from beaker dyeings, with hydrosulfite and sulfoxylate together with varying quantities of caustic soda and soda ash. Reviewing these data it will be seen that with hydrosulfite, where only soda ash is used, many of the colors give, for all practical purposes, no yield. These are Indanthrene Rubine RA, Carbanthrene Blue BCF and Ponsol Golden Orange RRT. The last named color is considered a satisfactory printing color. In most instances the introduction of soda ash increases the color yield, particularly in the cases of Indanthrene Brown BRA and Ponsol Violet AR. The reducing agent sulfoxylate decreases the color yield. It is interesting to observe, however, that, with the exception of Indanthrene Brown BRA, the yield follows the same trend as in the case of hydrosulfite with the increasing amount of soda ash.

Cloth was padded through dispersions of various vat color pastes in water and dried. Swatches were then padded with solutions containing varying amounts of caustic soda and soda ash with hydrosulfite and also with sulfoxylate. They were immediately aged wet, oxidized and soaped in the usual manner. Relative color strengths were then calculated from spectrophotometric charts. The results are given in Table VII. In some instances the dyeings were so uneven that no satisfactory charts could be obtained on the spectrophotometer. In these cases visual observation permitted the following comments:

Ponsol Golden Orange RRT. When only

TABLE VII

Cloth pigment padded with vat color and dried, then padded through solutions of alkali and reducing agent and aged wet. Data show comparative depths of shades.

Nos. 1-5, 6% Hydrosulfite	*Golden Oronge 3GA*	*Brown AR*	*Pink FF*	*Brilliant Violet 4RN*	*Violet BN*	*Blue 2BDG*	*Blue BCF*	*Jade Green*
1. 6.0% NaOH	100	100	100	100	100	100	100	100
2. 4.5% NaOH 2.0% Na_2CO_3	112	103	118	95	102	126	99	101
3. 3.0% NaOH 4.0% Na_2CO_3	125	103	88	91	96	114	105	113
4. 1.5% NaOH 6.0% Na_2CO_3	155	125	89	97	113	129	100	114
5. 8.0% Na_2CO_3	56	71	20	62	116	125	19	96
Nos. 6-10 10% Sulfoxylate								
6. 6.0% NaOH	125	112	189	88	96	114	111	101
7. 4.5% NaOH 2.0% Na_2CO_3	131	127	177	95	97	112	111	106
8. 3.0% NaOH 4.0% Na_2CO_3	141	131	172	117	94	108	104	104
9. 1.5% NaOH 6.0% Na_2CO_3	150	127	178	116	98	114	62	101
10. 8.0% Na_2CO_3	89	93	111	116	97	127	48	83

TABLE VIII

Comparative depths of shades of pigment prints padded and aged.

	Padding Solution				*Time of Ageing. Columns I and III (seconds)*
	6% NaOH 6% Hydrosulfite	*6% NaOH 10% Sulfoxylate*	*8% Na_2CO_3 6% Hydrosulfite*	*8% Na_2CO_3 10% Sulfoxylate*	
Indanthrene Golden Orange 3GA	100	81	46	98	15
Ponsol Golden Orange RRT	100	87	25	74	15
Ponsol Brown AR	100	75	61	85	30
Indanthrene Brown BRA	100	89	42	85	30
Ponsol Khaki 2G	100	100	19	53	60
Calcosol Red BN	100	73	125	107	15
Ciba Brown G	100	84	75	140	15
Indanthrene Olive RA	100	76	14	64	30
Sulfanthrene Pink FF	100	61	23	67	15
Indanthrene Rubine RA	100	74	21	23	60
Ponsol Brilliant Violet 4RN	100	119	61	135	15
Ponsol Violet BN	100	90	112	118	60
Ciba Blue 2BDG	100	66	92	95	15
Carbanthrene Blue BCF	100	113	22	73	60
Ponsol Jade Green	100	77	86	91	30
Ponsol Violet AR	100	88	100	78	15

With sulfoxylate the ageing time was 5 minutes.

soda ash was used, depth of shade was less than one-half of that obtained when any caustic soda was present.

Indanthrene Brown BRA. When hydrosulfite was used the results were similar to those in Table V. When sulfoxylate was used the results appeared to be more satisfactory than Table VI, even when straight soda ash was used, and better than those obtained with hydrosulfite.

Ponsol Khaki 2G. Satisfactory color yields were obtained when hydrosulfite and caustic soda were used, but when soda ash alone was used, practically no color yield was obtained. When sulfoxylate was used with straight caustic soda, excellent color yield resulted, which gradually decreased as the caustic soda was replaced by soda ash.

Indanthrene Olive RA. Results were similar to those obtained with Ponsol Golden Orange RRT.

Calcosol Red BN. A trend in the opposite direction was shown as the best color yield was obtained with straight soda ash and poorest when caustic soda was used.

Indanthrene Rubine RA. Practically no color yield was obtained unless caustic soda was present. This requirement applied to both hydrosulfite and sulfoxylate.

Table VIII gives the color yield of pigment prints developed by the pad-steam method, using the chemicals and steaming time as indicated. The significant point about the series is the relatively high color yield obtained with such colors as Indanthrene Rubine RA, Ponsol Khaki 2GA and Indanthrene Olive RA when caustic soda was used with either hydrosulfite or sulfoxylate.

Based on the yield obtained with soda ash and sulfoxylate, the colors were listed in order of the ease of reduction as follows:

Ciba Brown G.
Ponsol Brilliant Violet 4RN.
Ponsol Violet BN.
Calcosol Red BN.
Indanthrene Golden Orange 3GA.
Ciba Blue 2BDG.
Ponsol Jade Green.
Ponsol Brown AR.
Indanthrene Brown BRA.
Ponsol Violet AR.
Ponsol Golden Orange RRT.
Carbanthrene Blue BCF.
Sulfanthrene Pink FF.
Indanthrene Olive RA.
Ponsol Khaki 2G.
Indanthrene Rubine RA.

To obtain high color yields, caustic soda should be used with Ponsol Khaki 2G and Indanthrene Rubine RA. Some of these colors are not listed in accordance with the commonly accepted order of printability. It should be observed that the poor printing colors fall in the proper sequence. Many old formulae recommend the use of caustic soda with certain colors for proper development.

4. Solubility data available showed no relation between printability and solubility. Some of the very soluble colors are very poor printing colors. One outstanding exception is that blues of the BCS type are poorly soluble and are also poor printing colors.

It is generally considered that dyeing cannot take place under most conditions unless the fibers are swelled. In the case of vat color printing, the cloth is steamed in a moist ager to obtain development of the print. It has been well established that the amount of moisture in the vat ager influences the yield and brightness of prints. During this process it has been stated that glycerine in the print paste absorbed moisture; that sulfoxylate and potassium carbonate reacted to reduce the vat color; and that, in the presence of the moisture absorbed by the print and the cloth, dyeing occurred. It is common knowledge that when a vat ager is started the temperature of the steam is 212° F. As the cloth runs through the ager the temperature increases until a temperature of about 230° F. is reached, depending on the condition of the ager, steam flow, etc. At this point the color yield decreases and some of the brightness is lost.

It has been shown by Urquhart and Williams *(2)* that the equilibrium moisture content of cotton materials is dependent on the relative humidity of the vapor in which they are in equilibrium. Isotherms plotting moisture regain against relative humidity have shown that the percentage of regain, starting with zero

TABLE IX

Comparative depths of shades of vat color prints aged at different temperatures.

	Aged at 212° F.	*Aged at 230° F.*
Indanthrene Golden Orange 3GA	136	126
Ponsol Golden Orange RRT	72	73
Ciba Brown G	196	135
Ponsol Brown AR	132	89
Indanthrene Brown BRA	27	20
Ponsol Khaki 2G	26	18
Indanthrene Olive RA	36	22
Calcosol Red BN	186	149
Sulfanthrene Pink FF	145	131
Indanthrene Rubine RA	31	17
Ponsol Brilliant Violet 4RN	192	165
Ponsol Violet BN	189	138
Ciba Blue 2BDG	147	113
Carbanthrene Blue BCF	59	43
Ponsol Violet AR	48	19

A pigment print with the same amount of dyestuff, padded with a solution of caustic soda and hydrosulfite, aged wet, and developed was taken as 100.

relative humidity, is low until a relative humidity of 70 per cent is reached; then the curves show a sharp increase, so that at 90 to 100 per cent relative humidity the moisture regain is very high.

Starting a fresh vat ager at 212° F. and considering that only water vapor is present, a relative humidity of 100 per cent exists. Water vapor is absorbed rapidly by the cloth and print material. As the moisture is absorbed, heat is evolved due to the latent heat of condensation of moisture. As the temperature increases, less moisture is available for absorption due to the decrease in relative humidity, until an equilibrium is established. Usually this takes place within 15 minutes of the start of the ageing operation. Strachan *(3)* has shown that in a vat ager, where the gas is water vapor, the amount of moisture present is directly proportional to the temperature. To obtain the relative humidity from the temperature the vapor pressure of water at 100° C., which is 760 mm., is divided by the vapor pressure of the water at the operating temperature of the ager. Assuming that it is 110° C. (230° F.), the vapor pressure of water at that temperature is 1,075 mm. and the relative humidity then is $\frac{760}{1075} = 70$ per cent. According to the report by Urquhart and Williams, it is shown that the amount of regain or moisture absorbed at 70 per cent relative humidity is about one-half that absorbed at 95 per cent.

A series of vat screen prints was run using a potash sulfoxylate formula. These prints were aged at 212° F. in a laboratory ager and at 230° F. in a plant ager. The results are tabulated in Table IX. The average color yield when aged at 212° F. is approximately 29 per cent greater than when aged at 230° F.

Several attempts were made to determine the solubility of the vat leuco under ageing conditions. Since prints are made with print pastes containing up to 20 per cent vat color paste, it is evident that after drying, there is a very high concentration of vat color on the fiber. It is possible to assume, however, that if any part of the dyestuff dissolves dyeing will start, thus allowing additional dyestuff to dissolve. Complete dyeing of the fiber at the printed area will result, if sufficient time is allowed, depending on the rate of solution and dyeing, and the dyestuff fiber equilibrium.

An attempt was made to determine if there was any degree of solution by mixing the active chemicals from the printing paste in a concentrated form, then placing the dyestuff and the chemicals in a melting point tube and observing the amount dissolved. One formula for a printing paste contained approximately 50 per cent solids, consisting of gums, 10 per cent glycerine, 10 per cent potassium carbonate and 10 per cent sulfoxylate. Assuming 50 per cent moisture would be absorbed by the print in ageing, then the dyestuff concentration in the ager could be calculated for any known concentration of dyestuff in the printing paste. For example, a print of Ciba Blue 2BD containing approximately 16 per cent dyestuff and prepared with one-part of color to five of paste, the composition on a solids basis (parts) would be as follows:

Gums, etc.	20
Glycerine	10
Sulfoxylate	10
K_2CO_3	10
Dyestuff (20 x 16)	3.2

If moisture were absorbed by the chemicals in ageing the amount would be 30 parts of water. Therefore, a mixture prepared as follows should approximate the conditions in the ager:

Water	15
Glycerine	10
Sulfoxylate	10
K_2CO_3	10
Dyestuff (Blue 2BD, 16%)	20

This mixture was prepared and placed in a melting point tube. The tube was attached to a thermometer and placed in a Thele tube at 100° C. The mixture turned golden in one to two minutes and solution started. It was possible to observe this reaction because a clear yellow colored solution appeared, and within 5 minutes the mixture dissolved.

Other indigoid colors were investigated and solution occurred. When anthraquinone colors were used it became impossible to observe what occurred, due to the more intense color of the leuco. When the melting point capillary was drawn very fine, the intensity of the color was so great that it was impossible to make any conclusive observations.

Various mixtures were prepared consisting of c. p. glycerine in which sulfoxylate and potassium carbonate were dissolved. Dry vat pigment was introduced into this solution. The mixture was applied to cloth which was then placed in a molten metal bath at 212° and one at 230° F. Reduction occurred, and after oxidizing and soaping, the samples showed that some dyeing had taken place. The results varied widely. In some cases there was no difference between patches heated to 212° and 230° F., while in other cases those at 230° were much heavier than at 212° F. This procedure can be used as a method of studying the effect of temperature upon vat colors, and also of evaluating glycerine substitutes.

These experiments demonstrated that without water present there was some fixation of color although the yield was poor. It suggested a new approach which might indicate the solubility of the leuco vat in water-solvent mediums, the amount of moisture present to obtain satisfactory printing, the effect of alkali in the reduction, and the effect of the solvent in reduction.

The following solutions were prepared:

	Solution (grams).			
	A	B	C	D
Glycerine	300	300	—	—
Water	—	—	300	300
K_2CO_3 (Anhydrous)	50	—	50	—
KOH	—	50	—	50
Sulfoxylate	50	50	50	50

Cloth was pigment padded and dried using 10 per cent dyestuff of double paste strength and 20 per cent of single paste strength. Two-inch squares of cloth were treated according to the following procedure: Place the sample on a glass plate and add approximately 2 ml. of one of the solutions. Cover the cloth with another glass plate, excluding air. The 2-inch square of cloth will float in the solution between the glass plates. Place the plates in an oven at 100° C. for 18 minutes. Remove from the oven and observe carefully. Move one of the glass plates one-half inch. This movement will show the solubility and bleeding, if any. Microscopic examination can be used. The squares of cloth were oxidized, soaped and comparisons made.

TABLE X

		K_2CO_3			KOH		
		Color of Vat	Solution or Bleeding	Yield	Color of Vat	Solution or Bleeding	Yield
Ponsol Brilliant Violet 4RN	1.	Bright Blue	***	40	Bright Blue	***	40
	2.	Bright Blue		60	Bright Blue		60
	3.			100			80
	4.	Bright Blue	*	140	Bright Blue	*	130
	5.	Bright Blue	None	100	Bright Blue	*	140
Ponsol Golden Orange RRT	1.	Bright Red-Violet	**	30	Bright Red-Violet	**	20
	2.			50			30
	3.			70			50
	4.	Bright Red-Violet	*	50	Bright Red-Violet	**	70
	5.	Red-Violet	No	10	Bright Red-Violet	*	90
Ciba Blue 2BDG	1.	Yellow	***	30	Gold	***	10
	2.			40			30
	3.			70			50
	4.	Yellow	None	100	Gold	*	60
	5.	Yellow	*	100	Gold	*	100
Ponsol Jade Green	1.	Red-Blue	***	30	Red-Blue	***	30
	2.	Red-Blue		40	Red-Blue		40
	3.	Red-Blue		50	Red-Blue		50
	4.	Red-Blue	*	70	Red-Blue	*	100
	5.	Red-Blue	*	100	Red-Blue	*	120
Ciba Brown G	1.	Yellow	**	20	Bright Orange	***	20
	2.	Yellow		30			30
	3.			50			40
	4.	Gold-Brown	*	40	Bright Orange	*	60
	5.	Yellow-Brown	*	20	Bright Orange	*	60
Calcosol Red BN	1.	Red-Violet	**	30	Red-Violet	***	30
	2.			40			40
	3.			50			50
	4.	Red-Violet	**	80	Red-Violet	**	80
	5.	Red-Violet	No	100	Red-Violet	**	100
Indanthrene Brown BRA	1.	Yellow-Brown	*	50	Red-Brown	***	40
	2.			70			50
	3.			90			70
	4.	Yellow-Brown	*	120	Red-Brown	**	110
	5.	No	No	60	Red-Brown	**	100
Indanthrene Rubine RA	1.	Dull Red-Violet	No	20	Blue-Green	**	20
	2.			20	Blue-Green		30
	3.			20	Blue-Green		60
	4.	Dull Red-Violet	No	10	Blue-Green	**	80
	5.	No	No	10	Blue-Green	No	130
Ponsol Violet BN	1.	Navy Blue	*	50	Navy Blue	*	50
	2.			60			60
	3.			80			80
	4.	Navy Blue	*	100	Navy Blue	*	100
	5.	Navy Blue	*	130	Navy Blue	No	120
Indanthrene Golden Orange 3GA	1.	Orange Brown	*	50	Red-Brown	**	20
	2.			60			30
	3.			70			50
	4.	Orange Brown	*	100	Red-Brown	**	70
	5.	Yellow-Brown	No	80	Red-Brown	*	100
Carbanthrene Blue BCF	1.	No change	Slight	10	Green-Red-Blue	*	10
	2.			20			10
	3.			30			10
	4.	No change	No	30	Green	No	20
	5.	No change	No	10	Green	No	50
Indanthrene Olive RA	1.	Yellow-Brown	*	30	Red-Brown	**	30
	2.			40			70
	3.			50			60
	4.	Slightly Yellow	No	30	Red-Brown	***	90
	5.	Slightly Yellow	No	20	Red-Brown	*	130
Ponsol Khaki 2G	1.	Slight Yellow-Brown Cast	*	20	Red-Brown	***	20
	2.			25			25
	3.			70			40
	4.	No	No	20	Red-Brown	*	60
	5.	No	No	10	Red-Brown	*	100
Ponsol Brown AR	1	Orange-Brown	*	50	Red-Brown	**	30
	2.			60			40
	3.			70			50
	4.	Slight change Orange-Brown	*	80	Red-Brown	**	80
	5.	Slight change Yellow-Brown	No	40	Red-Brown	*	100
Ponsol Violet AR	1.	Red-Brown	No	All poor 20-30	Red-Brown		
	2.						
	3.				Red-Brown	**	40
	4.	Red-Brown					80
	5.	Slight change to Yellow-Brown			Red-Brown	*	100

* Small amount of solution or bleeding into the medium.
** Increase in solubility or bleeding.
*** Large quantity soluble.

The solutions used were as follows:

	1	2	3	4	5
Series A K_2CO_3					
Solution A ..	100	85	70	50	—
Solution C ..	—	15	30	50	100
Series B KOH					
Solution B ..	100	85	70	50	—
Solution D ..	—	15	30	50	100

The results are tabulated in Table X.

Comparisons were made visually, taking as a standard the same pigment padded cloth developed by the pad-steam method, using 10 per cent caustic soda, 10 per cent hydrosulfite, and steaming for 18 seconds.

Examination of Table X indicates the following:

(a) Reduction and solution occurs in the glycerine vehicle.

(b) The amount of dyeing which occurs is related to the amount of moisture present.

(c) The poor printing colors, as listed, show practically no reduction nor solution with potassium carbonate. With potassium hydroxide, however, the reduction and solution appeared to be complete, in the glycerine vehicle, but practically no dyeing took place.

(d) This procedure is a means of evaluating so called "hygroscopic agents".

While it is generally considered that glycerine is added to print pastes to provide a hygroscopic agent, these results indicate that it also functions as a solvent. In this connection it was believed that a study of glycerine and other so called "hygroscopic agents" should be completed.

Weighed samples of cloth were padded through 20 per cent solutions of various hygroscopic agents, dried and weighed. The increase in weight indicated the amount of hygroscopic agent present on the cloth. The cloth containing the hygroscopic agent was then aged 5 minutes in an ager at 212° F. Upon removal from the ager, the sample was placed into a weighing tube, closed and weighed. The amount of moisture picked up in ageing was then calculated. The results are shown in Table XI.

5. Molecular Weight. The molecular weight of 50 vat colors was tabulated and compared with the variable results obtained and with the general trade knowledge. No relationship was found to exist. For example, Indanthrene Rubine RA, a poor printing color, has a molecular weight of 494 which is approximately that of some colors satisfactory for printing. On the other hand, Ponsol Khaki 2G, also a poor printing color, has a molecular weight of 1096.

Conclusions

The following conclusions may be stated regarding the conditions that affect vat color applications:

1.—The substantivity of the leuco compounds of the vat colors examined is such that satisfactory exhaustion in dyeing and printing can be obtained throughout the working range of dyestuff concentrations under proper conditions of moisture, alkalinity, and reducing agents.

2.—Moisture is a vital factor. Complete reduction and solubility can be affected in various media, but the proper amount of moisture is necessary in order to obtain satisfactory dyeing or printing.

3.—The type of alkali, such as carbonate or hydroxide, gives widely varying results with different dyestuffs.

4.—The concentration of alkali necessary to effect reduction and dyeing is relatively small. As the concentration increases over this minimum, the color yield diminishes rapidly. Results obtained with varying concentrations of alkalies appear to have significant practical values.

5.—The ease of reduction varies widely from color to color under equal conditions of time, temperature, and chemicals.

6.—Temperature affects the rates of reduction and exhaustion in dyeing. In the ageing of prints, temperature determines the relative humidity and moisture absorbed, which, in turn, influences the color yield. With glycerine as a solvent medium, temperature affects the color yield of certain vat dyestuffs.

7.—The solubility of the leuco compounds of the vat colors examined is generally satisfactory under proper conditions of chemicals, reducing agents, solvents and moisture.

8.—The molecular weight of vat colors apparently has little effect upon their behavior in dyeing or printing.

9.—Hygroscopic agents or solvents materially affect results in printing, and the procedures outlined provide new and unique methods for evaluating such products.

10.—If the optimum conditions for each color are obtained, most vat colors are suitable for both dyeing and printing. It is not commercially practical at the present time to print certain vat colors due to one or more of the factors listed. The colors satisfactory for printing are those which show the least variation in results under all conditions.

TABLE XI

Action of hygroscopic agents in ageing.

	% Hygroscopic Agent Present	% Moisture Picked Up in Ageing	% Total Agent and Moisture
Untreated Cloth ..	..	1.35	..
Glycerine	17.5	22.6	40.1
TP672	6.6	7.2	13.8
Glyceraid	11.4	18.3	29.7
Urea	21.0	24.4	45.4
Potash	24.8	35.7	60.5
Soda Ash	20.9	14.7	35.6
Triethanolamine ...	16.5	21.5	38.0
Corpolin	18.9	31.7	50.6
Propylene Glycol ..	2.0	2.7	4.7
Diethylene Glycol ..	4.4	5.7	10.1

Data calculated on the weight of the original sample of cloth.

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Glenlyon Print Works.
Lincoln Bleachery & Dye Works.
Rhode Island School of Design.
Rhode Island State College.
Sayles Finishing Plants, Inc.
United States Finishing Company.

References

(1) Am. Dyestuff Reptr. *33*, 502, (1944); ibid. *35*, 3, (1946).

(2) Urquhart and Williams, J. Textile Inst., *14*, T 183, (1923).

(3) Strachan, Am. Dyestuff Reptr. *27*, 240 (1938).

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Radio Broadcast—

(Continued from Page P57)

ing. There was a time, back in 1880-1900, when dyes which are looked upon as the most fugitive on the market were considered fast and named accordingly, because they were a revelation in comparison with the inferior natural dyes then in use. I am often asked: "How many dyes are there on the market today?" There are approximately 3,000 individual dyes in active use, each representing a separate chemical entity. Why so many? Well, to begin with, one cannot completely upset the habits of people who have been running this industry for many generations. If grandpa started using certain dyes in 1900 which were then considered the latest development and he chooses to continue to order them, even though better colors are now available, his wishes will be complied with if the amounts involved are sufficient to make the manufacture worthwhile. This means that the development of new and superior products does not eliminate from active use older products which are approaching obsolescence. We do not manufacture a new dyestuff every time a stylist declares that a new shade is going to be fashionable. Many people think that we, as dye manufacturers, create styles or that new styles are made possible because we have developed a new dyestuff. Practically all conceivable color shades are available to the dyeing industry and have been available for many years and only at great intervals does a new dyestuff appear on the market which extends to a noticeable degree the range of the pallet available to the designer. I will close my discussion on dyes by saying that within reason there is a color for every purpose.

Question—Mr. Herrmann, you say there is a color for every purpose we may want. Does that mean a color won't fade in washing, won't fade from light, or perspiration, or something else?

Mr. Herrmann—Unfortunately, the universal dye that has all the virtues is about as rare as the human being who is all-perfect, just as the great singer may not be a good speaker. Only one class of dyes approaches the description of near perfection and those are selected vat colors which combine beauty with the highest degree of durability. They offer extreme fastness to light with remarkable fastness to washing. They are truly durable but, unfortunately, their scope of application is limited and all the pretty pinks and baby blues on dainty fabrics are not available in this degree of permanence.

Announcer—May I break in right here and say our time is about up and we have enjoyed having you ladies and gentlemen with us in our WBBQ studios this afternoon. Also I would like to say the Augustan Citizens are delighted that you saw fit to honor us with your convention here this year. We sincerely hope that some time in the future you will favor us with another visit. This is Thurston Bennet speaking on behalf of Radio Station WBBQ and thanks to all AATCC members for being with us and wishing you luck in the months and years to come.

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Fast Colors on Cotton Hosiery—

(Concluded from Page P59)

agent is constantly present. Addition of the extra 2%, before overflowing the dyebath with cold water, is a safety measure to insure the reduction of the dyestuffs before oxidation. If the dyestuffs are not well reduced before oxidation, a mottled or smutty dyeing will be the result.

Common salt is used on only a few dark shades. In most cases very little additional strength is gained by use of salt. Salt will increase the depth of some dyestuffs dyed cold. This advantage is usually lost when the same are dyed at high temperatures. When common salt is used, it is added after the addition of the hydrosulfite. About 20% common salt is sufficient to obtain the maximum exhaust of dyestuffs.

The overflowing, cold wash is the best way to finish a dyeing. On light shades this is often omitted. In this case, the dyebath is drained and then the hosiery is given successive cold washes until free from caustic soda. The safe way is to give the hosiery a cold overflowing wash. With some dyestuffs, even in light shades, there is a tendency to form oxidation marks unless the fabric be given an overflowing wash. These will appear as chalky deposits on the surface.

For oxidation, sodium perborate is added to the cold bath so that its full oxidizing properties may be utilized. The perborate will break down slowly with the increase in temperature, giving even and complete oxidation.

The detergent is added after oxidation of the dyestuffs. It is desirable to have these completely oxidized before soaping, which removes surplus dyestuffs clinging to the fibers. This also affects particle size of dyestuffs, improving the brightness of shade. With some a considerable change in shade occurs in soaping.

The softening of hosiery serves two purposes, to increase the ease of boarding, and to give the finished hosiery a pleasing hand. Agents for this purpose vary with local conditions and taste.

Conclusion

We have prepared an exhibit showing several vat shades on fine gauge mercerized cotton anklets. These anklets have been divided into two groups. The first row shows samples taken from the dyebath before addition of sodium hydrosulfite. The second row shows samples of the same shades, from the same dye lots, after finishing.

This exhibit shows considerable dyestuff deposited on the fiber before addition of hydrosulfite. This is very important, because during this period the exhaust of the dyestuffs is very slow, and it follows that more level dyeing will result.

No claim is made that these are the ultimate in dyeing procedures. No doubt simpler formulae will be evolved by the many dyers working with these dyestuffs, but these methods of dyeing mercerized cotton hosiery have been in practical use in a number of dyehouses for many months, and excellent results have been obtained with them.

Open Discussion

Question—I think I understood you to say that both corn sugar and dextrine were in the formula. I would like to know why.

Mr. Asbury—White corn dextrine is used to protect the chlorine-fast blues when they are reduced at high temperatures. White corn dextrine is not a good reducing agent. Corn sugar is a fair reducing agent.

Question—Have you tried dextrine alone?

Mr. Asbury—Yes. Dextrine does not reduce well enough.

Question—After a lot of navy blue goes to the pairing room, variations in the shade of individual socks are noticed, even though these socks are themselves uniform. To what do you attribute this and what suggestions do you have to overcome it?

Mr. Asbury—There are two things I would consider. First, change the dyestuffs combination; second be sure that the hydrosulfite is added very slowly.

Question—How do you eliminate the smudged appearance sometimes found in shades of cordovan?

Mr. Asbury—The selection of dyestuffs is very important. Do not use black or khaki as shading colors. Be sure to have the dyestuffs in good reduction at the end of the dyeing and then give a running overflowing wash.

Question—What success have you had in dyeing 130 needle, unmercerized cotton hosiery?

Mr. Asbury—I know one mill that is dyeing combed yarn hosiery. The shades being dyed are black, navy, cordovan and grey. They are having no trouble.

Question—I understand that work has been done on unions between rayon and mercerized cotton. What do you know of this?

Mr. Asbury—This is very new. We should have some information later; at the present I do not know.

Question—If the shade is incorrect do you add directly to the reduced dyebath?

Mr. Asbury—The best way to dye vat colors is to establish the formula and make the dyeing completely through the oxidizing step before sampling.

Question—Have you been able to eliminate wet crocking on naphthol reds or maroons?

Mr. Asbury—Some synthetic detergents improve the fastness to crocking but none have been found that will completely eliminate it.

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Consumer Complaints—

(Continued from Page P66)

Answer: Colored gingham should not be washed with a white washing formula involving chlorine bleach. If the item is predominantly white, there is a chance it will be washed with a white work washing formula.

Question: Do laundries use antichlors?

Answer: No! In any laundry the white work is washed as a group. There are few items that show chlorine retention; therefore normal practice is to wash the fabric and to add chlorine along the way somewhere, usually close to the middle of the process. Then they give certain number of rinses. Usually they find the alkaline content of the last rinse water very close to that of their tap water. At that point the chlorine will be all gone from normal fabrics. The final operation in most laundries involves what we call "souring", with a product like sodium acid fluoride, in some few cases acetic acid. There are a few others. This would eliminate any chlorine that remains in normal fabrics. There would be very little, anyway, after 4 or 5 changes of water.

Question: Does AIL have a standard of detergency for all laundries?

Answer: No we do not. We are working in that direction, but because of the variety of soils available, we have not picked any particular one as a standard. I think your organization has had correspondence with us on this subject. We have collected a group of over thirty so-called "standard soils" that are being used throughout the country for soil removal evaluation. Perhaps we shall pick, not one soil, but a group of three that differ for laundries using them. Again I must refer to those two groups of localities such as Washington and Pittsburgh. The man in Washington is not going to show the same type of soil removal as the man in Pittsburgh, and he does not need to.

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Modern Trends—

(Concluded from Page P68)

Recording steam flow meters, in conjunction with tachometers and recording temperature controllers, will give the operator a complete story of what is taking place at all times on slack loop dryers, tenter frames and similar finishing equipment. Such controls may prevent overdrying or over-curing as well as assist in saving steam or fuel.

Heat Reclamation

With present prices of fuels at a high level and the definite trend towards high temperature operation, there is more and more interest in heat reclaiming and booster heating equipment. Finishing plants realize that they are often throwing BTUS and money down the drain at a rapid rate. By installing heat reclaimers on bleaching and dyeing ranges, it is not only possible to save heat but also to keep more uniform temperatures than with open steam lines or closed coils. Condensate from many hot units cannot be returned to the boiler because of danger of contamination. By running such returns into a condenser or water heater, an additional source of hot water may be made available for processing. Where heat reclaimers have been installed, they have often paid for themselves in a very short time, while easing off the steam demand on the power plant.

Future Trends

In bleaching, there has been some efforts made to combine both peroxide bleaching and sodium hypochlorite or activated chemic bleach in the same range set-up. A range originally designed for such a combination bleach might well show appreciable savings in chemical costs.

We also understand a new chemical bleach process, now under development, may reduce bleaching time to much shorter periods than is now considered possible. This process is carried out in equipment that is relatively inexpensive and takes up little floor space. Chemical costs are said to be quite low.

A new continuous open-width boil-off consists of a caustic saturator and an enclosed steam box, heated top, bottom and sides with closed steam coils. The bottom is filled with water which is turned into steam by immersed steam coils. In the first section of the box, steam is blown on the cloth from perforated pipes as it travels over top and bottom rolls. The goods are also sprayed with hot water and in the latter part of the box are immersed in a series of wells through which hot water flows counter-currently.

Another scour and bleach unit makes use of a series of small open J's totally enclosed in a steam atmosphere. Here the goods are never piled in large masses and their position is changed relatively frequently.

Almost instantaneous, high temperature desizing with enzymes is now being carried out in routine production and we may expect additional developments of such products.

Both liquid sulfur dioxide and solid carbon dioxide have proven useful in caustic soda neutralization on bleach ranges, in washing after mercerizing, after the boil-off and a number of other places. These materials are cheap and safe to use and have proven their place on washing equipment not having sufficient capacity for heavy goods running at high speeds. Their use is often cheaper than installing more washers requiring additional steam and power.

In dyeing, studies of the behavior of individual dyes in the short volume, high temperature reduction baths, as well as in a steam atmosphere, is going on. Chemical stabilizers and auxiliaries for dyeing are also being studied with the thought of improving their wetting, stability, dispersing and other properties.

A new piece of equipment for the high temperature dyeing of vat colors consists of an impregnation pad, a booster box and a steam chamber. The unique feature of this equipment is the use of water-cooled rolls and box on the booster so as to keep the temperature low. Goods enter immediately into the steamer, filled with steam from water heated by closed coils. The exit box is the same as the entrance booster in construction. The liquor levels in the two boxes seal the unit so that no steam may escape. It is said that "dead cotton" may be covered by this method and colors subject to decomposition at high temperatures are not affected.

A continuous chemical feeding system in conjunction with an automatic titration system offers promise in eliminating variables in both bleaching and dyeing. By feeding one or several chemicals and diluting with water in definite proportions, a positive ratio can always be maintained. Coupling this feed with a continuous sampling and electronic titration arrangement, the whole system automatically controls itself so as to keep each chemical at the desired concentration.

Each new development breeds another and we believe we can safely say we are entering on a new era of chemical and engineering progress. All of this progress can be directly traced to what we stated was our major trend, namely, the general acceptance by the textile industry of the engineer and the chemist.

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Report, BDTI Student Chapter

AT a meeting of the Bradford Durfee Technical Institute Student Chapter on the evening of December 9th, 1948, Dr. Lloyd D. Barrick, Chemical Director of the Dye Department, Arnold, Hoffman & Co., Inc., spoke on "Problems in the Manufacture of Dyes."

Respectfully submitted,
MIRIAM MURPHY,
Secretary, pro tem.

FLAMMABILITY OF CONSUMER TEXTILES

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National Cotton Council of America

DURING the past two years the AATCC Committee on Flammability of Consumer Textiles has been working as a part of an industry technical committee of the National Bureau of Standards, Commodity Standards Division, in attempting to develop an industry standard for evaluating the flammability of clothing fabrics. The function of the AATCC Committee as a part of the NBS Technical Committee has restricted complete progress reports until this time, and only occasional discussions of the subject have appeared in the *American Dyestuff Reporter* (*36*, 141, 204, 303, 345, 379 (1947)). The work of the NBS Technical Committee was reported to the NBS Standing Committee on the proposed Commercial Standard TS-4350 on November 5, 1948, and the information contained in the report was released to the AATCC committee at that time with full permission to publish the testing results in the *American Dyestuff Reporter*.

The AATCC flammability tester and tentative test method were first described in the *American Dyestuff Reporter* of May 6, 1946, and a description will also be found on page 148 of the 1947-1948 *Technical Manual and Year Book* of the association. This method of test is the basis of the proposed commercial standard TS-4350, and was the testing method used in both of the interlaboratory programs in which the AATCC committee took an active part. The second of the two interlaboratory programs also involved testing on the horizontal flammability tester developed by the Fire Protection Section of the Bureau of Standards.

The two-year study which included the interlaboratory programs had two principal objectives:

I. The determination of fabric types to be considered hazardous according to the test method outlined in Commercial Standard TS-4350. (The AATCC inclined tester.)

II. The determination of the degree of correlation that could be obtained when a number of laboratories tested the same fabric on the inclined tester.

The committee made no study of flammability hazard in textiles with the intent of defining limits of safety or danger. The hazardous burning rates defined by the developers of the two machines were accepted for the purposes of the study. Conclusions as to the safety or nonsafety of any fabric that was tested are limited by the extent to which the arbitrary burning rates in the two test methods are related to actual hazard in clothing.

The conclusions and recommendations which followed the two-year study were given unanimous approval by the AATCC committee as well as by the entire NBS Technical and Standing committees. These conclusions and recommendations are reported here, and will be followed by a general discussion of the procedure and an analysis of the testing results.

General Conclusions

1. Precise determination of fabric flammability is impossible by either of the testing methods under study. Inherent variations in fabric construction, together with uncontrollable differences in the manipulation of the testing machines, resulted in significant differences in the values reported by several laboratories in many cases.

The two interlaboratory programs have shown that it is absolutely necessary to thoroughly test any rate-of-burning machine on a wide range of fabrics and in several laboratories before any valid conclusions can be drawn as to the reliability of the test method or machine. Furthermore, correlation in the very rapid burning zone does not mean that correlation can be obtained in the critical zone in which hazard is differentiated from safety.

2. The inclined flammability tester developed by the AATCC is recommended as being preferable to the horizontal tester developed by the National Bureau of Standards for the evaluation of the flammability of textiles because: (a) smaller samples of fabric may be employed, (b) operation of the test is simpler, (c) results are at least as consistent as those obtained with the horizontal tester.

3. It is recognized that neither the inclined tester nor the horizontal tester can measure flammability of textiles with sufficient accuracy to make reference to such tests feasible in any municipal, state, or federal laws. Furthermore, although several flammability testers other than the horizontal Bureau of Standards machine and the inclined AATCC mcahines have been brought to the attention of the committee, there is no evidence to show that such testing methods are more satisfactory than those which have been studied by the committee. Thorough testing of all rate-of-burning devices is recommended.

4. It is believed that the inclined tester might serve as a guide to industry in the production of clothing fabrics which will have a minimum hazard to the public. Recommended modifications of this testing device might make its use suitable under such voluntary programs as the Commercial Standards of the National Bureau of Standards. Under such voluntary programs failure of the method of test to define flammability within narrow limits would not prevent its functioning in a useful manner.

Specific Conclusions

5. In its present form the inclined tester does not distinguish the relative hazard existent in a pile fabric which flames rapidly and voluminously and that which exists in a short-napped fabric over the surface of which a small flame will flash rapidly.

6. The inclined tester will consistently demonstrate the hazard of long pile fabrics such as were used in the manufacture of the now notorious cowboy suits.

7. The arbitrary time limit of six seconds employed in the inclined test cannot at present be demonstrated to have any relationship to actual hazard in textiles for wearing apparel. The use of this time limit, however, will be effective in controlling long pile fabrics such as those used to make the cowboy suits.

8. The inclined tester measures the flammability of flat woven fabrics such

* A member of the Technical and Standing Committees of the proposed Commercial Standard TS-4350, under the chairmanship of C. W. Rulon of the Underwriters Laboratory, and also of the Committee on Flammability of Consumer Textiles of the AATCC, under the chairmanship of Dr. H. E. Hager, General Dyestuff Corporation. The work reported here was done through the cooperative efforts of the members of the above two committees. A list of the membership of the Bureau of Standards committees can be obtained from H. A. Ehrman, National Bureau of Standards, Washington, D. C., who is secretary to the NBS committees.

as sheers and nets with a reasonable degree of consistency.

9. The horizontal tester consistently demonstrates the hazard of long pile fabrics such as were used in the manufacture of children's cowboy suits.

10. Since all samples are ignited by the horizontal test method, large differences in burning time are frequently observed since both primary * and secondary burning takes place in many samples. The scatter of individual strip burning rates in the horizontal machine is so broad that in many cases the test results have no significance.

11. The horizontal tester performs with reasonable satisfaction on fabrics where the burning is exclusively either the primary or secondary types. On such fabrics, particularly those showing only primary burning, the horizontal tester is a reasonably consistent, although not exact, device for measuring fabric flammability.

12. The arbitrary six second limit in the inclined method is more restrictive on chenille than the equally arbitrary ten second limit used in the horizontal testing method. On the other hand, rapid secondary burning of napped and brushed fabrics does not seem to be consistently faster in the inclined test than it is in the horizontal test.

Recommendations

Any thorough study of textile fabric flammability which is designed to eliminate hazard in clothing must go far beyond simple rate of burning measurements made upon small strips of cloth. Since all textiles of natural cellulose or regenerated cellulose are combustible, it is obvious that under certain circumstances garments made from any of these fibers could cause injury to the wearer if the fabric were ignited. The construction of the garment, the ease with which the garment can be removed, and other factors may frequently have as much influence on the inherent fire hazard in a garment as does the rate of burning of the fabric itself. It must also be recognized that neither a horizontal strip nor an inclined strip in a testing machine will simulate accurately the circumstances of actual clothing fires in which relatively large sections of fabric are suspended vertically. Both the horizontal and the inclined test methods eliminate almost entirely the important factor of flame acceleration, and at least in the case of nets, flame acceleration is the phenomenon which contributes most to the hazards which exist in long trailing garments composed of such fabrics.

There are some special types of fabrics which are now generally recognized to present a fire hazard above and beyond that which is found in many of the more commonly used types of textiles. Pile fabrics in which the pile of regenerated cellulose may be from one-half to two inches long have been responsible for some of the most tragic burnings in which textiles have been involved. In such fabrics flame propagation is both rapid and voluminous, with intense heat being developed. It would not seem reasonable that the elimination from the market of such fabrics should wait upon the more thorough study of textile flammability that will be necessary for complete understanding of fire hazard in clothing. The interlaboratory programs of the technical committee on TS-4350 have shown that both the horizontal tester and the inclined tester will demonstrate the dangerous flammability of long pile cellulosic fabrics. Since the inclined tester seems preferable to the horizontal tester, it would be highly desirable to make use of the inclined tester as soon as possible for the control of fabrics which have a hazard similar to that observed in long pile rayon fabrics.

In order that the ambiguous behavior of the inclined tester on certain classes of fabrics may be eliminated so that it may be usefully employed in the control of fabrics in which the hazard is generally recognized, the following recommendations are made:

1. The timing string in the inclined tester shall be separated from the face of the fabric by a distance of approximately — inches, so that secondary burning of insignificant volume will not burn the string, but so that rapid and voluminous flaming will still show the same burning rate as when the string was against the face of the fabric.

2. It is not suggested that any change be made in the six second limit at this time, but that a real investigation be conducted so that the true relationship between fabric rate of burning and clothing hazard may be better understood.

3. It is recommended that chenille fabrics be given further study before being placed under the restrictions of this test method. The horizontal tester indicates that some chenilles considered dangerous by the inclined test method are not unduly hazardous. While there is little doubt that certain chenilles should be restricted from clothing use, it is not yet certain where the line should be drawn.

4. It is recommended that the possibilities be studied for setting up a "twilight zone" for fabrics whose burning rate is between four and eight seconds. The recommendations of this zone does not imply that hazard or safety is satisfactorily defined under four seconds and over eight seconds, but rather that the region between four seconds and eight seconds should be recognized as a region of indeterminate flammability.

NOTE: It has been suggested that the "twilight zone" might function in the following manner:

a.) Fabrics having a burning rate of under four seconds would be suspected of hazard and would be labeled or flameproofed before shipment.

b.) Fabrics burning between four seconds and eight seconds would be shipped as safe, but efforts would be made to change construction or to make other changes which would increase the burning time to more than eight seconds.

c.) Fabrics burning over eight seconds would be considered safe.

(The above suggestions for the use of the "twilight zone" are dependent on satisfactory modification of the testing method, according to recommendations 1, 2, and 3 above.)

Method

Since the AATCC testing device and tentative test method is fully described in the 1947-1948 *Technical Manual and Year Book*, no further discussion of this method will be attempted here. The horizontal test method developed by the Fire Protection Section of the National Bureau of Standards is described in NBS circular C-455 (issued August 23, 1946), copies of which are available at the Government Printing Office in Washington. Briefly, the horizontal test method utilizes a specimen 4½" wide and 12½" long. The specimen is conditioned, combed, and mounted on a horizontal rack in a special tester in which the temperature is maintained at 140°F. Ignition of one end of the fabric is accomplished with a Tirrill gas burner using a standard flame, and the time to burn ten inches is recorded. The average of ten specimens is used to indicate a sample's flammability; samples which have a burning rate of ten inches in less than ten seconds are considered hazardous.

Procedure

In each of the two interlaboratory programs the samples to be tested were cut to size, marked carefully so that the direction

* Primary burning is a term used to describe the combustion or flaming of a fabric which has no nap, pile, or tufting, or to describe the combustion or flaming of the base fabric in a textile which has a nap, pile, or tufting. Secondary burning is a term used to describe the combustion or flaming of the nap, pile, or tufting. Primary and secondary burning may occur simultaneously in a fabric, or either type of burning may take place independently of the other kind. Generally, secondary burning is much more rapid than primary burning.

of nap or pile was the same in each case, and packed in a uniform manner without compression in identical boxes. The samples for the first series were cut 14" by 12" since only the inclined tester was being used, while in the second interlaboratory program most of the samples were cut 30" by 30" to provide enough material for both the inclined and the horizontal tester. In the second testing program, there was not sufficient material to supply every laboratory with each of the twenty-one fabrics being tested, and three of the samples were not large enough to permit ten strips on the horizontal machine.

Seven laboratories participated in the first program in which 33 fabrics were tested by the inclined AATCC method. These laboratories were as follows:

Office of the California State Fire Marshal
J. C. Penney Company
National Bureau of Standards
U. S. Testing Company
Princeton Knitting Mills
American Viscose Corporation
Industrial By-Products and Research Company

In the second interlaboratory program the first six of these laboratories tested a majority of the 21 different fabrics being used on both the inclined tester and the horizontal tester of the Bureau of Standards. A seventh laboratory, the Mellon Institute for Industrial Research, tested this series on the inclined tester only.

The detailed directions for the conduct of the testing which were sent to each laboratory in the first testing program were slightly modified to permit more uniform conditioning before being sent out on the second testing program. Instructions for the operation of the horizontal testing machine were sent out by the Fire Protection Section of the National Bureau of Standards. After the first testing program, all the inclined testers used by the seven original laboratories were returned to the U. S. Testing Company for a check-over to make sure that each one was identically equipped.

Throughout the testing programs, every effort was made to insure identical preparation of the carefully selected fabrics and to have the actual testing conducted in a uniform manner in each laboratory. The testing was not left to inexperienced technicians but was supervised by experts who were thoroughly familiar with the operation of the testing device (the inclined tester).

Program A

The following is a description of the 33 fabrics used in the first interlaboratory program:

No.	Description
1	56"-19x14-1.00 25% Wool-75% Cotton Blanket Lining
2	Woven Stripe Flannel (Pink, Blue, & White)
3	Bleached Flannel (White)
4	Printed Flannel (Ducks)
5	Flannel Diaper (White)
6	Plisse (Blue)
7	Navy Blue Interlining
8	Yellow-Blue Striped Interlining #1
9	" " " " #2
10	Orange Interlining #1
11	" " #2
12	46x32 - 8.10 - 46" All Rayon Marquisette (Treated) Scoured Permanent - Non-slip
13	36"—3.50—54x42 White Flannel
14	41"—3.50—40x34 Tan Lining
15	41"—5.00—25x21 Mottled Flannel (Lining)
16	27"—81x48—3.16 Canton Flannel
17	27"—6.35—43x42 White Flannel
18	Printed Plisse #1
19	" " #2
20	Flannel (Blue Printed Flannel)
21	Finished Net—Imported
22	Dotted Swiss (White)
23	Flocked Cotton Voil (Navy Blue)
24	Checked Lawn
25	Cheesecloth
26	Printed Flannel
27	All Combed Marq.—Perm. Fin.—White
28	Baby White Chenille
29	Reg. "
30	Baby Blue Chenille
31	Reg. "
32	White Waffle Chenille
33	Peach " "

Program B

The twenty-one fabrics used in the second interlaboratory program were as follows:

No.	Description
1	White Cotton Bunting (Napped—with Pattern)
2	Gray Rayon Pile Fabric (Simulated Fur)
2A	Gold Rayon Pile Fabric (One Inch Pile)
3	Double Napped Cotton—Dyed Yarns
4	Regular White Chenille (Low Grade)
5	Blue Cotton Bunting (2-ply Double Napped)
6	Blue Brushed Rayon (Knit)
7	Rayon Marquisette (Continuous Filament)
8	Cotton Marquisette
9	Pink Cotton Bunting (2-ply Double Napped)
10	White 12 Oz. Canton Flannel
11	Cotton Flannel—Bunny Pattern—Double Napped
12	White Hob-Nail Chenille
13	Regular White Chenille (A)
14	Baby White Chenille (A)
15	Regular White Chenille (B)
16	White Feathertuft Chenille
17	Baby White Chenille (B)
18	White Waffle Chenille (A)
19	White Waffle Chenille (B)
20	Cotton Spot Marquisette

Data from the Two Interlaboratory Programs

The complete data on each of the 54 fabrics tested by the seven laboratories in Program A and Program B are included in the report of the NBS Technical Committee. Nearly five thousand individual strips were tested in the two programs, requiring 42 pages of data in the NBS report. The data has been summarized in this report because of space limitations, and only the laboratory mean of 19 of the fabrics in Program and the 21 fabrics in Program B is shown for each laboratory. Unfortunately, this summarized information does not permit as full an understanding of the operation of the testers as is desirable, particularly in the case of the horizontal tester. However, copies of the complete NBS Technical Committee report are available and may be obtained from the technical service department of the National Cotton Council, 1406 G Street, N.W., Washington 5, D. C.

PROGRAM A—AATCC METHOD
Laboratory Mean (10 strips)

Sample No.	A	B	C	D	E	F	G
1	7.0	6.4	8.7	9.1	9.8	9.7	8.7
8	2.7	3.3	10.0	4.3	3.4	5.2	1.7
10	1.4	1.1	1.5	1.8	1.3	1.5	1.2
11	1.7	1.1	1.3	1.8	1.6	1.8	1.2
12	16.3	13.3	17.7	14.8	17.6	21.4	12.9
15	6.7	1.2	1.9	2.2	3.5	2.0	1.1
16	15.3	19.4	21.0	20.5	18.6	31.7	18.6
21	10.9	8.8	9.7	11.3	10.9	11.4	9.9
22	7.6	7.1	8.9	9.6	8.6	9.5	7.0
23	7.9	7.1	9.4	8.7	7.9	9.1	7.4
24	9.1	7.4	9.5	7.9	8.9	10.0	9.2
25	9.0	7.2	7.3	8.8	8.4	10.7	7.9
27	13.1	11.0	13.0	13.6	13.5	15.1	11.4
28	10.2	6.7	9.3	11.1	7.7	9.6	4.9
29	5.3	2.7	3.6	7.1	6.1	5.0	2.9
30	12.4	8.0	8.0	13.0	11.4	9.0	5.8
31	5.2	3.3	5.7	7.0	5.8	4.8	3.3
32	9.1	5.9	7.3	10.8	7.8	7.7	4.5
33	6.6	5.4	5.9	11.9	7.1	6.9	6.2

PROGRAM B—AATCC METHOD
Laboratory Mean

Sample No.	A	B	C	D	E	F	G
1	7.4	5.2	7.8	16.8	IRE	21.5	13.7
2	—	3.1	5.8	3.9	—	6.6	3.0
2A	1.6	1.5	1.2	1.6	—	1.8	1.6
3	1.2	1.4	0.9	4.2	DNI	3.3	1.3
4	1.8	1.9	1.9	2.5	13.0	3.4	2.2
5	6.4	2.7	4.4	5.7	15.7	18.8	7.0
6	7.6	5.4	4.3	6.6	—	18.7	8.8
7	14.9	11.2	13.0	12.4	14.9	14.5	11.2
8	11.3	8.0	11.1	10.1	10.1	10.4	8.8
9	2.2	3.8	8.0	8.7	12.6	7.7	6.4
10	1.3	2.3	2.6	3.5	IBE	5.7	6.8
11	5.6	1.5	1.1	2.3	DNI	2.7	3.6
12	7.4	5.8	5.8	8.8	30.9	10.7	9.8
13	2.6	3.1	3.4	4.5	—	—	3.5
14	12.9	13.3	8.4	10.9	—	—	10.2
15	5.1	3.9	4.0	5.0	—	—	3.7
16	18.9	14.9	14.5	21.4	29.8	33.2	16.8
17	—	7.2	6.0	9.4	—	—	6.4
18	—	5.1	—	—	—	—	5.2
19	—	4.3	—	5.6	—	—	4.2
20	11.0	9.1	10.3	9.0	11.3	10.6	8.8

PROGRAM B—HORIZONTAL TEST
Laboratory Mean

Sample No.	A	B	C	D	E	F	G
1	51.1	58.7	55.5	39.0	—	48.0	73.3
2	—	22.1	19.8	10.6	—	21.8	16.1
2A	5.7	4.0	6.1	4.1	—	5.3	5.1
3	172.6	75.6	5.4	3.2	—	2.6	53.7
4	7.9	8.5	5.9	10.1	—	7.9	6.5
5	6.8	21.5	8.7	6.9	—	4.4	4.3
6	18.8	115.8	60.0	7.7	—	19.7	69.2
7	45.4	44.6	38.0	40.3	—	46.0	40.4
8	29.3	30.2	26.4	30.8	—	32.5	30.0
9	8.7	44.2	24.4	4.7	—	8.1	18.4
10	8.2	45.7	60.2	34.8	—	2.8	109.4
11	21.8	107.5	3.1	2.7	—	2.3	105.6
12	83.8	87.0	77.7	91.2	—	79.0	90.3
13	7.0	9.8	9.3	10.9	—	—	11.4
14	34.8	181.9	36.9	65.5	—	—	68.4
15	13.8	16.0	14.5	13.9	—	—	13.1
16	53.3	80.8	34.1	65.4	—	49.3	33.8
17	—	36.9	23.5	27.9	—	—	19.3
18	—	22.6	—	—	—	—	17.4
19	—	20.2	—	31.9	—	—	16.2
20	23.6	23.4	20.0	23.8	—	25.7	23.6

Discussion of Results

To facilitate discussion of the results, the fabrics can be separated into seven classes as follows:

Class I—Short napped cottons
Class II—Long napped cottons and brushed rayons
Class III—Nets
Class IV—Sheers
Class V—Plisses
Class VI—Tufted fabrics (chenilles)
Class VII—Rayon pile fabrics

The fabrics used in the two programs are then classed as shown below:

Class I—Program A—Nos. 2, 3, 4, 5, 7, 9, 13, 14, 16, 17, 20, 26
Program B— —

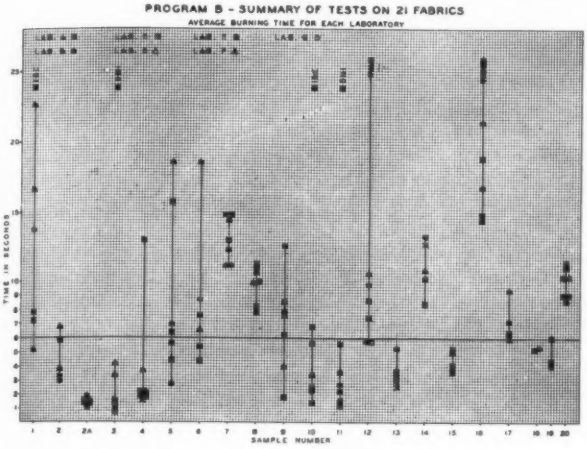

Chart I

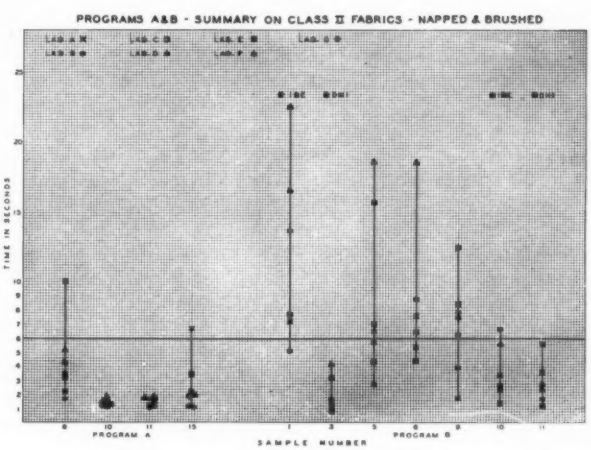

Chart II

Class II—Program A—Nos. 1, 8, 10, 11, 15
Program B—Nos. 1, 3, 5, 6, 9, 10, 11
Class III—Program A—Nos. 12, 21, 25, 27
Program B—Nos. 7, 8, 20
Class IV—Program A—Nos. 22, 23, 24
Program B— —
Class V—Program A—Nos. 6, 18, 19
Program B— —
Class VI—Program A—Nos. 28, 29, 30, 31, 32, 33
Program B—Nos. 9, 12, 13, 14, 15, 16, 17, 18, 19
Class VII—Program B—Nos. 2, 2A

Inclined Tester

Class I Fabrics

Cotton flannelettes and similar cotton fabrics with a short nap were generally not ignited or if ignited burned slowly, exhibiting primary burning only.

According to the interpretations of this test, and insofar as this class of fabrics is represented by those samples tested, Class I fabrics would be considered safe.

Sample No. 16 in the first testing program was the only sample of this class which ignited with enough consistency to supply figures that might be used to check correlation. The burning rate was considerably removed from the six second critical range, however, and therefore it would not seem worthwhile to analyze these figures in detail.

Class II Fabrics

Well brushed cottons and rayons having a soft or full hand generally exhibit secondary burning in which the flame's volume is never great but which nevertheless advances rapidly over the surface of the fabric. The actual rate of burning of this type fabric can be as rapid or even more rapid than that observed in long pile rayons. In most cases the base fabric is not ignited and the flame goes out once the tip ends of the fibers on the napped surface have been burned off. Since this type of secondary burning does not reinforce itself, in other words the volume of flame does not increase as burning progresses, the rate of burning will be nearly independent of the position of the fabric or the direction of the burning. The secondary flame may travel as rapidly downward as upward, and sometimes faster horizontally than upward at an angle of 45 degrees.

The first interlaboratory program demonstrated the rapid secondary burning that occurs in Class II fabrics. In some cases, such as samples No. 10 and 11, the averages reported by each of the seven laboratories fall in a narrow range and therefore provide satisfactory correlation. Samples No. 1, 8, and 15, however, indicate that an intermediate length of nap, or some other condition such as nap irregularity, will cause quite divergent results among the laboratories and a consequent lack of correlation. Program B demonstrates even more clearly the difficulty in obtaining satisfactory correlations with Class II fabrics which differ from the evenly fleeced type represented by samples No. 10 and 11 of the first program. Chart II shows how the average burning times reported by the seven laboratories in Program B differ on Class II fabrics.

Class II fabrics are extremely sensitive to preparation and handling. In the two interlaboratory programs, the samples were selected and delivered to the laboratories in a far more uniform condition than would ever be possible in commercial practice. The laboratories themselves evidently differ slightly in the manner of preparation of the fabrics for testing. To a large extent this is demonstrated by the superior correlation obtained with nets in both Program A and Program B. Since nets exhibit primary burning only, no special preparations of a nap or pile are necessary.

On the basis of the two interlaboratory programs, it is evident that the inclined tester does not provide satisfactory interlaboratory correlation on Class II fabrics, and that it is impossible in any many cases to determine on which side of the six second limit the sample belongs. Furthermore, the relationship of unreinforced secondary burning to actual hazard in clothing has not yet been made clear.

Class III Fabrics

The four nets included in Program A and three nets in Program B all burned at times averaging greater than six seconds, and all would be considered safe by the interpretation of the inclined method of test. Since all of the nets burned at a rate greater than six seconds, there is a tendency to overlook correlation. It should be noted, however, that while the agreement on classes of fabrics which show primary burning only is better than that usually obtained in Class II or Class VI fabrics, the method could not be considered an exact test by any means. If there are nets which burn at rates in the five to seven second range, differences such as were found in testing nets in Programs A and B would be quite insignificant.

Class IV Fabrics

Although no Class IV fabrics, sheers, were included in Program B, those tested in Program A give about the same results as the nets in Class III. The inclined tester gives a satisfactory indication of the relative flammability of these fabrics which show only primary burning, but the instrument could not be considered an exact measure. As with nets, interlaboratory correlation with sheers is better than with fabrics showing secondary burning. The results are summarized in Chart IV.

Class V Fabrics

The plisses were included in Program A by special request. They are, of course, well on the safe side according to the inclined method of test, and detailed discussion of the tests on these fabrics is not indicated.

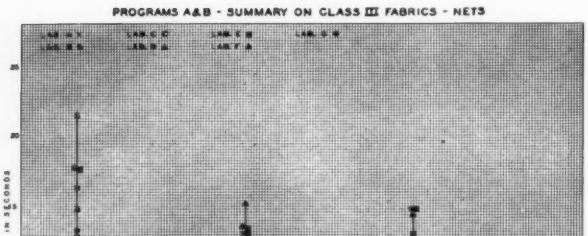

Chart III

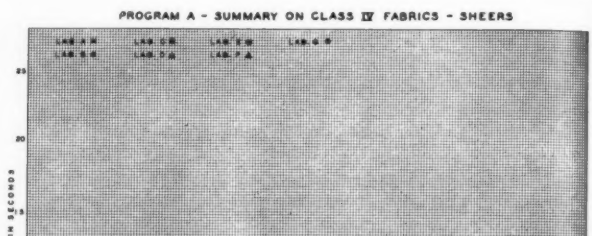

Chart IV

Class VI Fabrics

Tufted fabrics or chenilles represent one of the most difficult types in tests of rate of burning. Generally, chenilles exhibit secondary burning, and a specimen of this class may be hazardous when the secondary burning is rapid. In chenilles, however, a great many variation of yarn, tufting, and other construction details are possible, and as a rule the chenilles are not as uniform in construction as are many other fabrics. Some chenilles will exhibit the rapid secondary burning of Class II fabrics in which the volume of flame is never important. Other chenilles are closer to the rayon pile fabrics and develop an appreciable volume of flame as burning progresses. This latter type of chenille will undoubtedly be hazardous if used in clothing.

Six chenilles were tested in Program A, and little or no correlation was obtained by the seven laboratories. Nine chenille samples in all were employed in Program B, but unfortunately there was not enough material in all cases to supply each laboratory with a sample. Agreement among the laboratories would appear to be slightly better in Program B than in Program A, although the lack of sufficient samples prevents a really satisfactory conclusion in Program B. Details of the tests on chenille will be found in Chart V.

The first interlaboratory program proved that correlation among the laboratories testing chenilles by the inclined method does not exist. The second interlaboratory program failed to show that tests on chenilles will prove anything better than an approximation of their flammability.

Class VII Fabrics

The primary objective of the AATCC committee which first developed the inclined tester, and the objectives of all those who have been concerned with textile flammability is the elimination from the market of fabrics such as 2A under Class VII, long pile fabrics. No. 2 and 2A in Program B are both placed in this category since they are both rayon pile fabrics, but the pile on Sample No. 2 has been trimmed to a considerably shorter length than that on No. 2A. All six laboratories that tested Sample No. 2A reported average burning times in the range of one to two seconds. Fabric of the type represented by specimen 2A burns very rapidly, and at the some time develops a dangerous volume of flame. The inclined tester performs with great satisfaction on material of this type, thus making it highly desirable that the anomalous behavior of the machine on other materials be removed by some modification of the test method.

Sample No. 2, a fabric with a shorter pile than 2A and consequently one considerably less dangerous, does not provide good agreement among laboratories, but it seems quite possible that further study

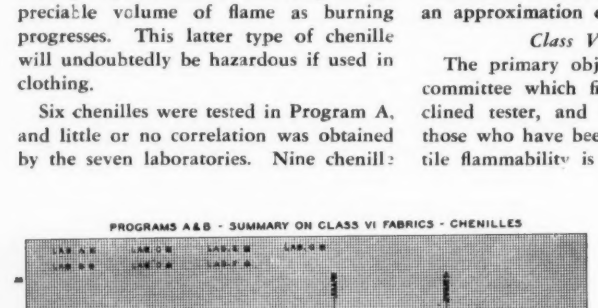

Chart V

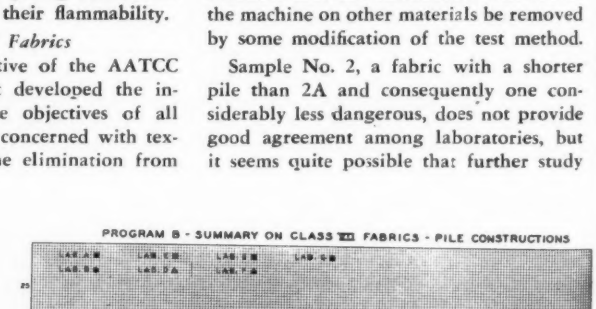

Chart VI

might clear up the difficulty encountered here. Chart VI summarizes the tests on the pile fabrics.

Horizontal Tester

The horizontal flammability tester developed by the Fire Protection Section of the National Bureau of Standards was not used in the first interlaboratory program because the commercial standard under consideration, TS-4350, outlined a method which used the inclined tester developed by the AATCC. The results of the first interlaboratory program, however, showed that the inclined tester did not provide the degree of interlaboratory correlation considered necessary for widespread adoption of the testing method and the Technical Committee on TS-4350 therefore considered it advisable to include in the second interlaboratory program the National Bureau of Standards horizontal tester.

Six horizontal rate of burning testers have been built for the Bureau of Standards and these were used in the second interlaboratory program. A larger sample than is used in the inclined tester is necessary in the horizontal method, and in some cases there was insufficient material to supply the horizontal test with the full ten strips. Nevertheless, sufficient results were obtained with the horizontal method upon which to base a number of conclusions.

Ignition in the horizontal tester is always positive, since a Tirrill burner is used and because timing does not start until the sample is ignited. No Group I, short-napped cottons, were included in Program B; therefore this program permits no conclusions as to the burning of this type of fabric. It is fairly obvious, however, that such fabrics will only exhibit primary burning in the horizontal tester, and that the burning rate would be relatively slow.

Class II Fabrics

Samples No. 1, 3, 5, 9, 10, and 11 were Class II fabrics, medium and long-napped cottons, and the brushed rayon, Sample No. 6, is also considered Class II. Sample No. 1 shows a fairly consistent slow rate of burning in the six laboratories, with an occasional secondary flash over at least part of the specimen length causing some lower burning times. These occasional rapid flashes are largely responsible for the deviations in mean burning rates reported by the laboratories, as complete primary burning would appear to be at the rate of 70 to 80 seconds in at least five of the laboratories.

Sample No. 3 illustrates the confusion that results from timing primary and secondary burning in the same manner. Laboratory A reports an average of 172.6 seconds, while Laboratory F reports an average of 2.6 seconds. All of the strips tested by A showed only primary burning, and all of those tested by F. showed secondary burning. The other laboratories generally reported burning rates which indicated both primary and secondary burning. Sample No. 5 also shows the same type of variation due to primary and secondary burning, although here most of the strips show fairly consistent secondary flaming. Sample No. 9 shows more conflicting rates than does Sample No. 5, although the results are more consistent than with Sample No. 3. Sample No. 10, however, is again quite irregular, as is Sample No. 11. It will be noted that generally Laboratory F reports secondary burning more consistently than the other laboratories, although with Sample No. 6, the brushed rayon, this laboratory reported a slower rate than Laboratory D. (For a clear understanding of the above, the complete data should be examined.)

The reports on Class II fabrics burned on the horizontal tester show that there is considerable variation within a laboratory, depending on whether or not the particular strip being tested shows primary or secondary burning. The results also show that there is a difference between laboratories, and that some of the laboratories prepare the samples in such a way as to get a predominance of secondary burning. It would appear that Class II fabrics might be very difficult or impossible to classify as safe or hazardous so long as the confusion between primary and secondary burning exists. It might be possible to disregard the rapid secondary flash which generally has little flame intensity, but it would be difficult to determine the limits of a safe flash and a flash of dangerous intensity.

Class III Fabrics

Samples No. 7, 8, and 20, nets, show good correlation among laboratories, and the variation within a laboratory is also small. The Class III fabrics all show only primary burning, and the horizontal tester is a satisfactory, although not exact, method for measuring primary burning.

Class VI Fabrics

In Program B, Samples No. 4, 12, 13, 14, 15, 16, 17, 18, and 19 are all chenilles. Unfortunately, there was not enough material in several cases to get a trial by all six laboratories. Sample No. 4 would be considered hazardous by both the horizontal method and the inclined method. The results by the six laboratories using the horizontal tester on Sample No. 4 are much more consistent than the results on Class II fabrics, but do not appear to be any more uniform than the results from the same six laboratories using inclined tester on Sample No. 4. Sample No. 12 on the other hand, a hobnail chenille, gives a more consistent rate of burning on the horizontal tester than on the inclined tester. On this sample the horizontal tester shows only primary burning, while the inclined tester permits the flame to jump from tuft to tuft. Sample No. 13, a regular chenille, does not indicate any advantage in correlation by either test method. In the horizontal tester, however, two laboratories report on the "safe" side of the borderline and three report hazard, while with the inclined tester all five laboratories report the sample dangerous.

Sample No. 14, a baby chenille, again shows the confusion between primary and secondary burning that was encountered with Class II fabrics. Both the inclined and the horizontal testers indicate that this fabric is "safe", but the inclined method is less inconsistent on this sample. On Sample No. 15 there is little to choose between the testers, but the horizontal tester reports "safe" while the inclined tester reports "dangerous". Results on Sample No. 16 are poor in both the inclined and horizontal testers from the standpoint of correlation, but all laboratories report a "safe" fabric. All laboratories also report Sample No. 17 as being "safe" and with more consistent results than obtained on Sample No. 16. Only two laboratories tested Sample No. 18, and no conclusion can be drawn on the correlation. The horizontal method reports this sample safe, however, and the inclined tester reports it to be dangerous. On Sample No. 19, the choice, if any, would be in favor of the inclined tester, and here again the inclined tester reports danger while the horizontal tester reports safety.

Class VII Fabrics

Sample No. 2A, the long pile rayon fabric, is found to be hazardous by each of the six laboratories using the horizontal tester. Neither test has an advantage in correlation, but the inclined tester shows the burning rate proportionately further from the safe line than does the horizontal tester. The shorter pile of Sample No. 2 shows safe burning on the horizontal tester in all five laboratories, while four of the five using the inclined tester report danger. Correlation on Sample No. 2 is poor by both methods.

Analysis of Results

The six charts provided with this report have been prepared only for the inclined tester because the wide differences between primary and secondary burning rates on the horizontal tester make the preparation of charts somewhat difficult. The charts are useful as a rapid graphic comparison of the means reported by the several laboratories. The charts, together with the statistical analysis of the data,

are presented in support of the conclusions of the interlaboratory studies.

The charts showing laboratory average illustrate a tendency for certain laboratories to report relatively fast burning rates while others have a tendency to report slower rates. Laboratories B and G are very often found to have reported the lowest burning time, and Laboratories E and F are frequently high. In Program A, Laboratory D recorded the slowest rate of burning on each of the Class VI fabrics. In Program B, Laboratory E generally records the slowest burning rates.

The tendency of a laboratory to record predominantly fast or slow results is accentuated by the type of fabric. A study of temperature and humidity reported by each laboratory showed no correlation between the ambient atmospheric conditions and the relative rate-of-burning recorded. Since laboratory trends toward fast or slow burning extremes are more noticeable in fabrics which have a pile, nap, or tufting, it might be deduced that variations in the handling or preparation of the fabric surface may be largely responsible for laboratory differences.

A study of the scatter of individual strip burning rates will show that burning times may frequently be obtained by three or four laboratories in as many different time ranges. For example, on Sample No. 5, Program B, all but one of the strips reported by Laboratory F burned more slowly than all of the strips reported by Laboratory E, and these in turn all burned faster than the ten strips in Laboratory G. Further, the ten strips in Laboratory G all burned faster than the ten strips burned in B and C. The scatter of burning times reported by Laboratory E is not substantially greater than that shown in Laboratory G or Laboratory B. Since the same general trend will be found in a number of Class II fabrics, as well as in Class VI fabrics, it would appear that the principal cause for non-correlation lies in the testing method rather than in fabric variation.

Fabric variation as a possible cause of non-correlation influences the testing results in chenilles more than in Class II fabrics, and in Class II fabrics more than in flat fabrics in which only primary burning takes place. Laboratory deviations on Class III fabrics are generally smaller than in any other class that was tested. Some chenilles show reasonable laboratory deviations, but with others the scatter of individual strip rates indicates significant construction irregularity.

The testing data suggest that on some textiles it may always be impossible to obtain rate-of-burning data that will have any real meaning or that will permit accurate classification of a fabric as safe or hazardous. While other fabrics such as those burning very rapidly or very slowly may be easier to classify, the greatest usefulness of a rate-of-burning tester may be in serving as a guide to industry in the production of fabrics having maximum safety to the consumer. In many cases the information as to types of fabrics which might be dangerous may be as useful in educating both the industry and the public as would any restrictions and regulations. A great many fabrics *can* be dangerous if improperly used, and very *few* fabrics will present any hazard at all if their burning characteristics are understood and if they are used in an intelligent manner. In those cases in which some fabric characteristic may result in unusual flame susceptibility, a rate of burning device may be satisfactorily employed to detect the hazardous nature of the fabric and thus permit its control.

Statistical Analysis

A statistical analysis of the means of the ten strips of each fabric was made by J. M. Cameron of the Statistical Engineering Laboratory of the National Bureau of Standards. The means for the different fabrics and laboratories concerned were tabulated for Program A—inclined tester, Program B—inclined tester, and Program B—horizontal tester. An analysis of variance was made for each table. Only the summarized results of the analysis will be presented here.

For all three cases the variation of the laboratory averages (averaged over all fabrics) about the grand average is greater than would be expected in the light of the variation of an individual measurement.

The standard deviation of an individual measurement, and the standard deviation assignable to lab-to-lab variation (laboratory component of variation) for the three sets of data were estimated as:

	s.d. of individual measurement	s.d. assignable to lab-to-lab variation
Program A–inclined tester	3.4	.8
Program B–inclined tester	2.9	.8 (Lab. F omitted)
Program B–horizontal tester	26.4	9.6

On the inclined tester in Program A and Program B, Class II had the most variable results.

If it is assumed that estimates of the standard deviation of individual measurements, 3.4, and the standard deviation of the lab component, .8, to be the "true" values, then for a fabric whose burning time is actually 4 seconds the following results would be expected:

	Percent of values that would exceed 4 sec.	6 sec.	8 sec.	10 sec.
One test at a lab chosen at random	50	28	12	4
Mean of one test at each of 7 labs	50	6	0.1	

The correlation between results obtained from inclined tester and horizontal tester in Program B is not significant. Since any consistent pattern of differences between laboratories in the two methods would be eliminated in the average for a fabric (over all laboratories), the averages for the same fabric by the two methods were correlated and a correlation coefficient of $r = .36$ was found. This is not significantly high.

In summary, laboratories differ significantly in burning times for the different fabrics; there is no consistent pattern of differences between laboratories; and, the inclined tester and the horizontal tester do not show a correlation sufficiently high that they could be used interchangeably.

The estimate of testing error associated with the inclined tester is of such magnitude that the suggested "twilight zone" would permit too frequent acceptance of hazardous fabrics (burning time under 4 seconds, e. g.).

—♦ ♦—

Latest Developments In Dyeing and Finishing—

(Concluded from Page P64)

Conclusion

New and improved synthetic fibers have given impetus to better procedures in the processing field. Chemical and dyestuff companies have brought out new materials and suggested new approaches to problems. Machinery manufacturers and instrument makers have done their share in providing equipment of simplified design, giving greater efficiency on less floor space. Testing companies are continually striving to correlate test methods with consumer demand, and have done a very good job. Considerable credit should also be given to the weavers, who have set up their own quality control departments.

Progressive dyers and finishers have utilized all these contributions, adding some of their own innovations, and now produce merchandise considerably improved in quality.

The war has made the consuming public quality conscious, and by cooperative effort of all parties, the standard for top quality merchandise has been raised tremendously.

TEXTILE COLORIST and CONVERTER Section

DERFLA HOWES SINGLETON
Editor

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A fortnightly letter of news and views

Converting Markets

Jan. 17, 1949

DEAR DERFLA,

Three days after the turn of year we received a 'phone call from Old Man Experience in the shape and voice of our friend Joe Jessup, the veteran rayon goods salesman.

Joe is the plain-spoken, fast-thinking type who is equally adept at the give-and-take of dealing with dress manufacturers or at driving to the heart of his bosses' most intricate converting problems. Men like Joe are going to be invaluable in the toughly competitive market that is now descending.

Joe had hardly said "hello" before we beat him to the question we suspected he had called us about.

US: "What do you think of the new Burlington prices, Joe?"

JOE: "First you tell me how firm they are."

US: "As firm as their discretion dictates and the way demand develops, which I think means they are a little firmer than a lot of people realize. But pardon me for talking so fast. Actually, I think they have taken the most constructive approach that was possible in today's unsettled market. You have goods to move. All God's little converters have goods to move. You'd expect that at this moment a big integration would have more than anybody."

JOE flattered our acumen by fully agreeing with all of this. Then he took over the conversation.

"An integration," said Joe, "is only an integration. Who said it was the Great Jehovah? If their prices are right, they will move goods. If too high, they have difficulty. But it will take a little while to find out. If these are only starting prices, they are neither too low nor too high for a start and that's where I'd agree with you that the move looks constructive. Anything more drastic as a January opener might have been downright frightening. What we all have to do now is reestablish confidence."

"But just as long as an integration is in the converting business, "Joe flowed on, "It has to be as flexible as the rest of us or else try another formula. And that goes for knowing how to trade in a trading market as well as for every other phase of operation. And believe me, this is a trading market that we are in right now. Here it is the middle of January and most cutters are waiting for retail orders to pick up. That will take a little while, too. Maybe by the middle of the month we will begin to see real action. It's certainly over-due. The cutters know we are waiting, too. What would you expect them to do in the meanwhile? Well, many of them are chiseling again, just like old times. Not an order comes through that we don't have to haggle over. And that takes time, too."

Joe paused to get his breath.

"There's one very important thing, very important, that the biggest integration has in its favor," Joe went on. "It's only making nice goods. Oh, that's very smart in a market like this, very smart. We old-timers in the business, with our fine reputations to protect, never stopped doing likewise, but right now I can see that a few of our competitors have begun to act up.

"Take Cynaras and Romaines, for example. Some of the fast boys are already taking too much shrinkage out of these goods. So porous they become, that you can see through them.

"Before the war this sort of thing may have seemed cute to sellers who went after the cheapest trade. Times have changed. I don't think they can get away with it now in any price line. The stores and the public don't want bad goods. And we converters don't want that kind of competition.

"So that's why I say that the big integration is smart in refusing to make anything but nice goods."

JOE rang off, leaving us convinced of his wisdom. What he said about quality maintenance raises a point of everlasting importance to all converters. Do you realize the investment that a big integration or any similar-sized operator must make just to keep on producing "nice goods" for the apparel markets? What it means in terms of the hundreds of thousands of yards of closely classified seconds, which must be sold into outlet that do not compete with the regular merchandise?

All of these questions came to mind when one of our distributing friends recently observed that under today's radically changed conditions "the converter is making the market." Of course that is true in the sense that a normalized availability of gray cloth enables the converter to exercise all of his customary flexibility as an entrepreneur. How he spends or does not spend his dollars for gray goods, can make a great deal of difference from a price standpoint.

But in "making the market" our converting friends had better not forget their responsibilities. They cannot afford to cut too many corners. They cannot afford to let down on their aggressiveness and enterprise as merchants. They cannot afford not to protect the mills' interests as well as their own.

Excuse all of this pontification (Joe started us going), but these are really burning issues. We'll try to do better next time.

Until then.

BILL LAWRENCE

Fabric Serviceability—the Key to Better Business

Address of CHARLES W. DORN

Director of Research Laboratory, J. C. Penney Co., New York City; Chairman, Technical Committee of the NRDGA, at the Piece Goods Group Session of the National Retail Dry Goods Association, January 13, 1949

FABRIC serviceability is truly the key to better business, for there is nothing that will build business more quickly and on a sounder basis than satisfied customers, customers who have bought merchandise at the right price and have found said merchandise satisfactory in every respect.

The Industry as a whole is continually encountering complaints and dissatisfaction on piece goods. These complaints can be due to a variety of reasons, improper construction, improper dyeing, improper finishing, lack of foresight as to the intended end use of the material and in many instances to faulty handling by the laundering and cleaning industries.

It will not be possible to accomplish improvement in merchandise through the efforts of one or two organizations, but it will require the combined efforts of all retailers and manufacturers.

I wonder how many of us realize that literally hundreds of thousands of dollars have been spent by various technical societies, such as the American Association of Textile Chemists and Colorists, the American Society for Testing Materials, etc., to develop test methods by which it is possible to predict what a fabric will do in consumer use. If the buyer would only use this information intelligently he would go a long way towards eliminating many fabric defects.

THERE are numerous factors that enter into assuring serviceable merchandise, and one of the major factors to be considered is color permanence on dyed and printed materials. The Federal Trade Commission has indicated in several decisions that if the term "Fast Color" is used, the material in question should not change an iota from its original shade after repeated washings, cleanings and exposures to light. At the present time there is no dyestuff in existence which will fulfill this requirement one hundred per cent. It has been generally considered that vat dyes are the most satisfactory dyestuffs for color permanence to washing, to light, etc., but there are several types of vat dyes, some being considerably better than others, as a general rule anthraquinone vats being considered the finest, while other vats of a different nature do not have as good fastness characteristics to washing and to light. This is important to buyers because the mere statement that a material is vat dyed does not necessarily mean that you have the finest dyestuffs available on that particular piece of goods. The buyer should also remember that certain shades, namely brilliant scarlets and like shades, are not available in vat colors, hence a line containing these brilliant shades cannot be described as all vat dyes.

The buyer should understand what is meant by the term washable. He should not be satisfied with the statement that a material is washable but he should go further and find out how it is washable. Industry has set up, with the National Bureau of Standards, a commercial standard, CS-59-44 entitled "Textiles—Testing and Reporting." In this standard we find four distinct types of washings for cottons and linens. The tests are in ascending severity, the No. 1 test being the mildest and the No. 4 test being the most severe.

If the textile passes the No. 1 and No. 2 tests for washing but fails the No. 3 and No. 4, such textiles are considered launderable under home conditions or in a commercial laundry under careful methods where the temperature does not exceed 120°F., when no alkalies or chlorine are present and when the material is not dried in direct sunlight. If the material in question will pass the No. 3 test, such textiles may be expected to give satisfactory performance in normal commercial or home laundering procedures, when boiling is not employed, when chlorine is not used and when the material is not dried in direct sunlight. If the material in question passes the No. 4 test, such textiles are considered of superior fastness to home and commercial laundering procedures, as the severity of this test permits the use of only those dyes having greatest resistance to fading. It must be remembered, however, that there is no protection implied in this classification against excessive use of chlorine in washing or the repeated effects of drying in direct sunlight.

You are probably wondering why the provision has been made in so many of these tests that the samples not be dried in direct sunlight. Dyes are affected more or less by bleaching compounds with the exception of vat dyes, and a few other specialties. Bleaching can be brought about by the action of peroxide, compounds of chlorine and various other chemicals, but in all cases the bleaching action depends upon the formation of nascent (fresh) oxygen. Unfortunately when wet textiles are hung in the sunlight the action of the sun on the damp fabric generates small quantities of nascent oxygen which causes a powerful bleaching action on the dyestuffs used. It is rather foolish to specify that bleaching compounds should not be used in washing and then neglect to inform the customer of what might happen when damp cloth is hung in direct sunlight.

From the above it can be seen readily that simply to know that a fabric is washable is not sufficient. It should be known *how* the fabric is washable and this information should be passed along to the customer.

THE subject of drycleanability also warrants some consideration. Dry cleaning is generally considered by the public to mean the cleaning of textiles with a cleaner's solvent such as naphtha, perchlorethelene, tetrachlorethelene, carbontetrachloride, etc.

What the public does not realize, however, is that these solvents only remove certain types of soil and that they cannot and will not remove water borne stains such as sugars, etc., nor will they remove successfully stains from perspiration in a garment. In order to remove such stains successfully the cleaner must resort to the use of soap and water which he does in many instances in so-called dry cleaning.

Hence, it becomes quite apparent that the dyestuff used in materials that are marked dry clean only should not only be able to withstand the action of cleaner's solvents but also the mild action of soap and water as used in the cleaning industry. The buyer should consider these facts carefully and make sure the merchandise he buys will withstand all the various methods of cleaning that are necessary for the dry cleaner to use for the thorough cleansing of an article or garment.

THE subject of lightfastness is one of equal importance. Again commercial standard CS-44 has set up a series of tests, which are in ascending severity, ranging from 10 hours exposure in the Fade-Ometer to 80 hours or more. The buyer should understand what the varying types of exposures mean in relation to end use of merchandise. Any sample which will not withstand 10 hours in the Fade-Ometer is suitable for use only where no degree of color fastness to light is required. If a sample will withstand 10 hours only, it is suitable for use where fastness to light is not important, but where some light fastness is desirable. Under this classification materials for end use in such articles as evening gowns would be found to be entirely satisfactory.

Another classification are those textiles which will withstand 20 hours exposure in the Fade-Ometer without showing appreciable change. Such textiles are considered satisfactory for use where moderate fastness to light is desirable, but not of major importance.

The third classification of textiles are those which will withstand 40 hours exposure in the Fade-Ometer without showing appreciable change in color. Such textiles may be expected to give satisfactory performance where good fastness to light is essential and will find themselves in such end uses as men's and women's outer garments, etc.

Class four textiles are those that will withstand 80 hours in the Fade-Ometer without appreciable change. Such textiles are considered to have superior fastness to light and may be used where such fastness characteristics are of major importance. In this category drapery materials should fall.

There is still a fifth classification where there is no specific number of hours specified and this test is intended for use on special types of material where extreme fastness to light is necessary.

There is not one of us in this room who has not been troubled from time to time with change of shade in dyestuffs on acetate rayons, known technically as gas fading. This particular change is confined to acetate rayons and it is brought about by the reaction of oxides or nitrogen in the atmosphere with the dyes, causing this peculiar color change. There is absolutely no excuse at the present time for you to be bothered with this condition as there are durable anti-fume agents on the market which can be applied to these textiles and which will prevent this undesirable color change.

SHRINKAGE is another subject which has assumed more and more importance in the last few years. We have, of course, had Sanforized cottons for a great many years and as a whole these materials have proved very satisfactory. There are more and more stabilizing methods coming to the fore for use on rayons which give the customer a better product. Now we have the so-called shrink resistant processes for wool. Unfortunately, many of these new products came on the market with great fanfare and exaggerated claims.

It is not generally understood what shrink resistant finishes will do for woolen and worsted fabrics. First of all, it is necessary to understand that in cotton, rayon, linen, etc., we have a relaxation shrinkage taking place the first time the garment is washed. This shrinkage may have been taken out prior to the time the customer received the goods by various processes, but when the relaxation shrinkage is completely removed we have a relatively stable article. In the case of wool, however, we not only have this relaxation shrinkage to contend with, but also the potential shrinkage which may occur and continue to occur each time the fabric is washed, through felting of the fibers.

The shrink resistant treatments for wool have nothing to do, whatsoever, with the relaxation shrinkage, but they do so treat the fibers so that they will not shrink further through felting. The fact that the wool or worsted is advertised as treated to resist shrinkage does not eliminate the necessity of sponging or shrinking the fabric before making into a garment. Considerable confusion may arise if the customer is not made aware of this fact and along these lines, I wonder how many of us go to the trouble to tell our customers that unless our woolens and worsteds have been preshrunk or made ready for the needle it is necessary for her to shrink this matrial in order to obtain a satisfactory garment.

THERE seems to be a demand developing for water resistant fabrics in yard goods so that the customer can make his own rainwear garments.

The efficiency of a water repellent fabric is not dependent alone upon the water repellent treatment which has been applied to it, but much is dependent upon the nature of the cloth itself, the cloth itself, the closeness of the weave, etc. Fabrics with more open weaves will not be as satisfactory as those that are more tightly woven. There is a new instrument known as the rain tester which will evaluate these materials and place them in different categories, which are as

It is not generally known that a highly efficient water repellent fabric can have its efficiency completely ruined by the use of linings which have not been treated with water repellent finishes. This absorbent lining seems to have the faculty of sucking water through the pores of the water repellent fabric, thus nullifying the water repellent effect completely and giving an unsatisfactory garment. These facts also should be made known to your customers, and they should be informed of the necessity of using a water repellent lining.

THE subject of flammability is one of which we have all been aware for some time. It has been costly to industry and when all claims resulting from the horrible accidents which occurred with the cowboy suits are settled it will have cost industry better than six million dollars, the retailer having come in for a considerable share of this expenditure.

The flammability tester which, on the request of the National Retail Dry Goods Association, was developed by the American Association of Textile Chemists and Colorists has proved very useful in determining the relative hazard of various textiles. Several machines of this type have been studied and the A.A.T.C.C. tester seems to be the most desirable. It is not one hundred per cent perfect, nor does it seem possible at the present time that any machine will prove to be so. There are too many variable factors and too many variables within the textile itself to permit a hard and fast line of demarcation between safe and hazardous materials. However, with the machine it is possible to know the nature of the material in question and to know whether or not it is relatively safe. Be sure that your customers get safe material.

THE CONVERTER SPEAKS HER MIND

No. 4 in a Series

by

HOPE SKILLMAN
Skillmill, Inc.

Miss Skillman

DURING the past several seasons when our booming post-war market has been adjusting to a better-than-normal state, several clear-cut axioms have emerged for the converter. The production of fine quality goods has proven its worth. The label that is recognized by the public as one they know and trust has demonstrated a steady selling power during seasons of mild flurries and upsets. But perhaps the most significant fact for the converter is the knowledge that what he must really sell is service. Good service. Prompt service. And a *special* service!

Every firm, of course, must decide what its particular special service will be. My own specialty is fashion. I make and sell fine, yarn-dyed woven cotton but, beyond producing recognized quality fabrics, I try to give my customers fashion leadership and protection. My entire organization is geared around this theme. Firms offering such specialized benefits must necessarily key their planning to the needs of their customers. Whether they sell to cutters, department stores, mail order or chain organizations, they must be specially equipped to handle each in a different way because the needs of each are different. The timing, quantities, and packaging needed by each type of customer is different and the converter's success depends upon his customer's success with his goods.

On the other hand, if the customer is to profit from this special type of operation, he must cooperate with the fabric converters who can offer him the benefits of their specialized knowledge. He should check with these firms when he is making his plans for future seasons. He should look to them for fashion guidance.

THE fabric house must be a source of fashion information! By applying this information, the converter not only helps his own position but strengthens his customer relationships. He should also specialize in planning his market outlets. If the specialty of the house is fashion, then the converter's goods should embody those items which fashion decrees is sacred.

I also believe this policy is best suited to independent converters in meeting the competition of the remaining integrations. Fashion is the independent converter's salesman. Specialization is his chief asset. A price policy alone is almost useless to him because there is no price for fashion. Fashion is an item which can't be bought. Since fashion is also fickle, it demands flexible, swift handling. The large integrations are for the most part big and unwieldy. They are not equipped to move as quickly as fashion may demand. This is not their fault. By the very nature of their operation they are not set up to handle such a quick changing function. The independent converter, however, can sway with the changing winds of fashion. He can make his organization a chameleon of style trends. And he must be aware of general style trends far enough in advance to translate them into fashions that spell leadership.

LONG-RANGE thinking is a necessity for almost every phase of the converter's business. It's essential for his promotions and can help in establishing a sound policy with regard to finished goods inventories. Many manufacturers discovered during the shortages of the war years that such planning could help their inventories too. Designers stopped dabbling with samples of hundreds of fabrics and concentrated on the several they had that were already bought. By buying goods instead of sampling, manufacturers found their designers were doing a better job. Instead of being confused by many fabrics, the designers were concentrating on a few. If we can keep this policy of planning in advance it will help everyone's inventory.

Stores also learned during these years the value of advance promotional planning. Often, before the war, stores would start working out a promotion just a few weeks before they wanted it to materialize. During the shortage years, they had to plan in advance if they had any sort of promotion at all; and most of them discovered that the advance planning was better integrated and produced a more successful promotion.

Looking ahead, then going ahead, with plans has proven a sound policy during unusual times, not only for converters, but also for cutters and retailers. The off-again-on-again basis of seeking one trade's business while other trades were lagging has helped to produce a lack of stability during our recent seasons of readjustment. If I were a buyer, I'd place my business with people who wanted it and could service it. In fact, I think service is the keynote of the fashion industries today —particularly for the converter!

THE RAYON OUTLOOK

by

ROBERT T. STEVENS

Chairman, J. P. Stevens & Co., Inc.

At the Piece Goods Group Session of NRDGA's 38th Annual Convention

IT is a great pleasure to have the opportunity to visit with you who are in the front-line trenches of fabric distribution. I found myself very humble in trying to arrange a few thoughts that would be worthy of your time and consideration. In fact, you know far more than I ever will know about the basic elements of what makes consumer acceptance of fabrics. The housewife is at your counters from nine until six, or later, to find the cloth that is her heart's desire, and you are the ones who know her preferences. We who produce the fabrics really want to provide the selections that are truly her heart's desire, but I am sure that we have not wholly achieved that yet, and I say this as representing a producer of many types of textiles—woolens, worsteds, cottons, and rayons. We make a lot of these different cloths, and have made them for a long time. Manufacturers get to be pretty sure of themselves, even complacent, feeling that their goods are just about the last word in everything. Most of us get that way until we get a shock.

One of these rude awakenings came the other day at a panel of the Textile Research Institute. The wool men, the cotton men, and the rayon men were there, and of course each group still thinks in lots of respects that the goods they make from their kinds of fibers are the ideal and the other fellow's fibers were really destined for horse blankets. It is traditional and a carry-over of some basic instinct of loyalty to what has gone before. These research fellows know that there are innumerable things to be done to better textiles, and they work tirelessly toward improvements and are always hoping that at the next symposium with their brother researchers there will be real advancement and betterment in textiles. Well, the critics just about demolished all the pretty theories that anyone in the group had been holding about his goods. These critics went through category after category of textiles, and told what was wrong with various kinds of goods and how they should be improved. They were reporting what the customers were saying, and of course all of you are hearing it all the time.

The number one blast was that customers really care very little about fiber content in a general sense, and are only remotely conscious of fiber type blends or whether it is rayon, cotton or wool. Customers want more satisfaction with respect to wearability and appearance. Women react to color harmonies and particular hues, to the inherent values in fabrics, to their handle, softness, drapiness, and those delightful qualities that are difficult to analyze in customer response but nevertheless exist. If we could only reduce these customer preferences and the reasons for them to simple equations, or cut it down to understandable facts like mathematics or biology, we would have real ground from which to grow acceptable new ideas in textiles. Somehow I am sure this will never be. There does not seem to be any magical formula for picking out the fabrics and patterns that customers will go crazy about.

NOW what is it that the customers are complaining about that the critics are making such an issue over? Here are some of the things customers wanted, among a great many other desires:

Napped fabrics, regardless of the fiber content, that will not "pill" up after washing.

Better synthetic fabrics.

Lining fabrics that will really wear, and will last as long as the major material itself in the garment.

New lingerie fabrics in variety, because at present there is the same fabric in a $2.00 slip as in a $10.00 slip.

Real crush-resistant velvet—velvets that are really crush resistant—not just talk.

New viscose and cotton moire that will not water spot or lose the moire effect in cleaning.

New rayon print cloths, something really new and in an original cloth for printing and not just the old cotton constructions.

Dirt-resistant fabrics made by building the dirt-resistant characteristics into the yarn and cloth construction.

Fabrics that retain the original characteristics after washing. Today there are too many warning tags hanging off the goods or the garments, and most of them get dry cleaned because of the warning. This does not take out all the dirt but people are afraid to wash them, and in many cases wisely so.

The textile research people and stylists should be directed more to the needs of fashion, because customers know what they want but too often are unable to get it from the textile industry. Too many trick finishes on cloths are used to attain a synthetic character, instead of building a natural finish into the cloth which the customers would greatly prefer. They want rayon taffetas that are wet proof—80 per cent of them have some water-soluble finish on them and are ruined when they get wet. In some cases, the emphasis has been turned around so that dresses are now washable but they cannot be dry cleaned, leaving the dress user in a quandary after the dress has been worn once or twice. The garment should be washable as well as dry cleanable. Fabrics that do not need ironing should be provided for men's shirts. Emphasis should be placed on developing new rainwear fabrics, because rainwear clothing is now in fashion and not an item for use only in a storm.

The foregoing are simply a few examples of getting down to brass tacks. All of us have been vaguely aware of the nature of these comments, but now that the war is over and supply and demand are coming into balance, the complaints are going to be

AS a matter of interest—there is getting to be a large amount of real consumer consciousness in this matter of performance and the nature of textiles. A larger number of people than ever before are wanting to know

more about textiles. Over the last four years, the number of women's clubs in the United States that have asked for, and received, information regarding textiles from the American Viscose Corporation has grown from 3,000 clubs annually to 17,000 clubs annually. These women's clubs receive educational data, leaflets, and are actually holding meetings to learn more about textiles. The rayon fiber or yarn manufacturer has largely lost his identity by the time the goods arrive at the retail counter, but most of the rayon companies believe that it is extremely worth while to take a lead in consumer education. Training and educational films will be available for consumer education. No doubt they will be available to you also for your training programs or other uses. This is enlightened self-interest, because the whole objective is to have the consumer get more satisfaction from rayon goods. It is coming down to the point that all of us have to render more service to the American people if we are going to stay in business.

The evidence in hand seems to be conclusive that a lot of people, young and old, are going to know a lot more about textiles in your town and mine. They are going to have a more intimate knowledge of what you sell, and their questions are going to require answers that show an intimate knowledge of what you are selling. It may mean that you should have available in those departments selling textiles and garments, persons who have had some instruction outside, as well as inside, your establishments. The key to a well organized piece goods department is obviously the time-honored principle of a good assortment of good merchandise, from regular sources, that is well promoted and sold at regular prices. This is not just a trite statement, but the historical and basic record in every type of business that has proved successful. It has been our experience, and we have a record of more than a century of production, which is a pretty fair proving period. You cannot get 'a 60-cent fabric for 45 cents, because it is just not in the cards. If you are buying on a price basis alone, then there must be produced lower-priced and poorer fabrics. The mills have skilled technological personnel and efficient plants so the public can have—and they should have—good fabrics. We can get light, washing, and perspiration fastness, shrinkage control and crease resistance, and all the other characteristics that are desired, but they cost more. The people who come into your stores really would like to have the quality item in your store, and not necessarily the lowest-priced fabric. The public wants good textiles and we want to make the best, but we cannot give you something for nothing.

IN our company we continue to think that rayon is a magical fiber, that it will continue to make great progress in the future, and that the producers will continue to make great strides in the production of even more desirable qualities. You see, there is a considerable measure of scientific predetermination of the end result sought; that is, the chemical scientist starts out to produce a certain characteristic and comes somewhere near getting it. And, in this connection, let me say that in spite of all the complaints of the critics that I have mentioned, the American yarn producer and fabric producer have done by all odds the best job that the world has yet seen. Wherever you may go, in Europe or elsewhere, nowhere will you find the degree of development that has been achieved right here in the great rayon industry of the United States.

We think there are two great factors in rayon that over the long term will continue to advance its acceptance—

1. Prices are relatively stable. During the post-war years, there have been higher all-around costs among the rayon producers, and the price of rayon has been increased moderately. Being a manufactured product, unlike wool or cotton, there is an inherent cost control possible which makes for a real stability in price. The rayon manufacturers have done a magnificent job in expanding their facilities to overcome short supplies, in improving their technology, and in increasing yarn and fiber values. The shortage of rayon had been a contributing factor to the poorer goods made during and since the war. There had been a stretching of the available materials over more yardage, and it has resulted in inferior goods. With the current improved rayon supply situation, however, there is little excuse for not making good fabrics.

2. The second value in the use of rayon is its great versatility. It has a very wide adaptability, not only in fabrics for which synthetic yarns or fibers are natural but also in many fabrics formerly made of cotton or wool. One can more readily change the types of fabrics made from rayon to meet fashion requirements. It is easier to make new fabrics with new fibers, either alone or in combination, than to attempt to make new fabrics with natural fibers. This really sums up the question of rayon's easy adaptability. It is a statistical fact that the synthetic fibers are crossing over into areas that were strictly in the realms of the natural fibers. Rayon is on the march, and large new machinery changes have been made to assist in this progress. The natural fiber industries lack this versatility, and there is a tendency for them to make more standard classes of goods for standard purposes. Rayon has had to do a lot of 'doing' to earn, in only 25 years, a slice of over 16 per cent of all the fiber consumed in this country. Nylon is one of the later remarkable developments. Its uses during war times for war purposes, and since then in industrial fabrics, hosiery, and apparel have been increasing. It is definitely on the upgrade. The ratio of rayon laboratories and scientific facilities to their producing organization is greater than in the other textile industries. It is essentially a chemical industry, conceived as such, and it pursues its ever expanding course on a scientific basis.

WE are spending large sums of money in the direction of research and the most modern laboratory facilities. In addition, our technical and styling staff has been substantially increased, all for the purpose of achieving new and better fabrics which will be in demand by your customers. Supplementing our technical staff, we maintain extensive Pilot Plant facilities, containing a wide variety of machinery with which to perfect textiles. The main objective of this Pilot Plant is to provide facilities for the creation of new fabrics from new ideas originating in our styling organization. It is amazing how many thousands of samples are made that seem sure to capture consumer interest, but fail utterly in this respect. It is also strange how some very simple character of cloth will capture the public imagination and hold it for such long periods of time.

We will continue to experiment and turn out what we think are masterpieces in the art of cloth making. But the new fabrics that in the end make style history will probably be simple weaves. It is like the story of the composer whose ambition was to achieve undying fame, struggling on heavy orchestration and symphonic scores. Hunger lifted him to fame, because even genius must eat. He wrote a ditty like 'Roll Out the Barrel,' and really became famous. That's like the textile business.

REMOTE CONTROL of DYEING CYCLES

by

F. D. WALLACE

Dominion-Burlington Mills, Ltd., Montreal

This paper was presented at the First Canadian Textile Seminar of the Textile Technical Federation of Canada.

The object of the Seminar is to allow Canadians to profit by the experience of Canadians. Dominion - Burlington Mills, Ltd. were selected to present a paper on the remote control of dyeing cycles. The paper deals with what they know about the subject from their own experience and observation. Editor.

WORK under controlled conditions is the aim of every modern dyehouse and we have approached the subject problem with that thought uppermost in our mind. We feel, as does every one, that the more control is centralized the better the work will be.

Our dyehouse first took shape on paper when we estimated that, if we put in as good equipment as there was available at the time and operated it efficiently, we should turn out good work. We also had the physical problem of putting our equipment into existing buildings, the design of which was not too well suited to our needs. It was necessary for us to fit our equipment into the existing narrow bays and then to think of operating it.

Our next step was to think about services to these machines—lighting, steam and water. We had to lay down all new lines for these three services and a considerable amount of energy was expended in trying to establish these as efficiently as possible, keeping in mind the existing supplies of both steam and water. Incidentally, we rebuilt our dyehouse floors and tried to design them so that they would always be dry. This particular part of our planning was not too well done, due in part to the design of our building and to some engineering errors.

Having established the machines and the service lines, we then considered what we term our control section.

OUR first thought was the entering of dyestuff to the individual machine. Consideration was given to various means of introducing the dyestuff to the machine. We thought of tub mixing and entering by dipper, steam injection from an individual mixing tank alongside each machine, by pump from a similar outside mixing tank with continuously circulating dye liquor through this tank. We also considered the installation, at this point, of a heater to provide temperature rise in the dye machines by means of this outside circulation of the dye liquor. We think that this last procedure might be made to work very favourably but the method would involve a large outlay of capital for dye circulating pumps, heaters and tanks, and would need added floor space and a considerable amount of engineering to ensure good even circulating in an ordinary winch machine. However, we still have this idea on file and feel sure that it could be successfully developed.

Our dyehouse floor area was not too great and we found that a second floor area would not be of too great service to the mill at large and that we could utilize this space as a colour mixing room and storage area. We then decided to put our mixing tanks on this second floor and feed our dyestuffs and auxiliaries direct to each individual machine. We then had to design this section, put in a waterproof floor to keep the dyehouse underneath clean and free from drips, determine a tank size for each individual machine. To digress here a bit, we might add that on tank size and design we erred. We installed all fifty gallon tanks for each machine.

Some could have been less, and others should have been greater, in keeping with the machine size they serve. As to design, we made ours too deep for the diameter and have had some difficulty with keeping the screens clean at the tank outlet where they are difficult to reach. The above errors are on the nuisance side and do not materially affect our efficiency.

We had to supply the mixing tanks with steam and water and then work out the feed lines and valve control to each individual machine. We used stainless steel for our tanks and for feed lines to the machines, the latter all welded construction with no fittings to make pockets in the line and no sharp angles. These lines lead to a central point in a perforated pipe which runs along the front of the machine, thus distributing colour evenly over the entire dyebeck. We have found that this gives very satisfactory results; the fourteen foot head that we have provides enough flow to give us even liquor distribution.

Having established our colour mixing room on the second floor at a considerable distance from the dyer's office, it was necessary to provide some means of getting the dyer's instructions to the colour mixers. An air conveyor system was installed for this purpose, the colour mixers working only on written instructions from the dyer's matching room. As an added convenience, an inter-communication system was installed and the combination of these two methods of communication have proved very successful.

At this point in our planning we had established our dyehouse, installed our machines, serviced them, fed them dyestuffs and now it was necessary to establish some control system for time and temperature of the dyeing cycles. Various instrument makers were consulted and we finally settled on one and, working from their suggestions, we established a control panel built up for the controls of each individual dyeing machine and installed it in the dyer's office, or matching room, from which emanates all the workings of the dyehouse.

IT might be advisable here to review some types of controls that were considered which were all based on thermal unit in the dyeing machine which, through a control instrument, operated a steam valve. The instruments considered were: ordinary temperature regulator non-recording; the same and recording; the same recording instrument again with an automatic time cycle; the same recording type of control with time cycle and rate of rise control.

We selected the recording type with time cycle without rate of rise control. We thought that this would be satisfactory when we considered our steam supply pressure, and estimated that we could control our rate of rise by the valve size activated by the control instrument. This has been found to be correct.

Most of our instruments were prepared for a second valve in the steam main as a holding valve; that is, after the temperature of our dyebath has been raised to the desired level, a larger or main valve in the line used for this purpose automatically cuts off and the smaller holding valve takes over the load of maintaining temperature. There are three reasons for this. First, when the large valve cuts into maintain temperature, a heavy shot of steam goes into the dye liquor and creates undue liquor turbulence, particularly when dyeing at a high temperature, which may upset the free running of the cloth load. Second, it causes excessive opening and closing of the main steam supply valve which gives undue wear to the valve seat; a smaller holding unit with less steam per minute flowing through it operates for a longer period which is easier on the valve and does not create the same turbulence. Third, the shock load on the steam supply is greatly reduced by the use of this small holding unit. In setting up an installation of this type there are many considerations to be made—speed of temperature rise desired, available steam supply, work water temperature, sizes of machines. We have found, for our particular setup, that the two valve system and the non-automatic rate of rise control unit is very satisfactory.

DYEING formulae are made up by the dyer, sent to the drug mixing room, the colour is mixed and fed to the individual machines on instruction from the dyer and then he sets his temperature for the desired dyeing cycles. All dye patches are brought to ths office for matching and the whole operation is controlled from this one spot. Each control instrument has a chart where the dyeing vagaries are recorded and can be related to the results of any individual lot.

This whole setup has been termed "remote control dyeing." We prefer to call it *centralized control dyeing.*

The system was worked out primarily to provide ease for rapid dyeings and at the same time to put the control of the work with the man best suited to handle it, that is the dyer, and to take any responsibility away from the man actually operating the machine. In our particular setup the man on the floor watching the machine controls only the admission of cold water to the machine, rinsing and dumping to the dye liquors, loading and unloading of the machines and the taking of patches to the dyer. As every one is aware, it takes a long time to develop a sense of responsibility in a man on the floor, particularly in setting up a new dyehouse. We felt that the less training that it was necessary to give these men, the easier it would be for us to start operating. This has been found to be true.

In the establishment of formulae in a new shop, we have found the whole system most useful. We know the weight of the cloth we put in the machine, we know how much dyestuffs and auxiliaries have been added to the water bath and, by checking our instrument charts, we know the temperature and length of time the particular lot was dyed. By progressive patches accompanied by the adds on our colour sheet, we can follow the progress of the dyeing and relate it to the temperature and time and we are able to establish quite rapidly formulae that will repeat with reasonable accuracy.

This question of centralized control dyeing is one that could be discussed at much greater length, but such discussion would have to be most general as there are no set rules for any one's particular requirements. Each shop has to be engineered as a unit because there are so many variables affecting any installation. The foregoing has been a description of what we have contributed to the knowledge on centralized control of dyeing cycles.

Mr. Oppenheimer

The Converter Speaks His Mind

(No. 5 in a Series)

by

PETER W. OPPENHEIMER

Secretary, Brand & Oppenheimer, Inc.

THE male peacock is a lordly bird, flamboyant in his riot of color. The female is drab and unattractive compared to her mate. So it is with the pheasant, lark, and many other varieties of birds. The lion in his majestic mane is far more colorful than the lioness, and in many other species of mammal, the male is the more attractive and colorful. Of all the creatures that now inhabit the earth, only the species of man adorns the female in colorful raiment and the male in comparative dullness.

Wherever nature has determined the colorful member of the family, it is the male. In the only case where the animal has made the determination himself, nature has been reversed and repudiated.

It has not always been so. Many early tribes and civilizations followed the laws of nature and garbed their males in colorful attractive attire. However, the greater our civilization, our knowledge of dyes and colorings, the further we have come from this law of nature.

Nature makes the male more colorful, since it is his duty to seek and attract his mate, and altho many moderns scoff at this, I believe that it is still true. The basic law of nature has not been violated, only its application has been reversed.

HOW it came about that our women parade and strut in colorful trappings, while our men subvert themselves to relatively drab greys and browns, I do not know. By now it is accepted custom, and the man who dares to wear too gay a necktie at the office, or a very colorful pair of shorts on the beach, is scoffed at and held up to derision by his drabber fellow men.

Although the reasons for this paradox on nature are not known to a simple businessman and must lie in the field of the sociologist, at least one result is strikingly apparent to anyone in the textile garment field. The volume of women's wear business is far greater than that of men's wear. Yet despite the simplicity and obviousness of this fact, little or nothing has been written or spoken on the subject. Our many analysts of the future of textiles go into great length on foreign market possibilities, increased end uses of fabric, the length of women's skirts, the increased number of suits in a man's wardrobe, etc., but none suggest that man in a man's world should outdo the weaker sex in adorning himself in colorful clothing.

Men have come a long way in sportswear and beachwear from the colorless clothing of past generations, but they still have far to go in attaining the beauty in attire that our women possess.

I DO not wish to suggest that sportswear is the proper attire at all times, and that we should immediately throw all of our suits and ties into the nearest trashcan. Better to retain the present forms of clothing, but to build and expand upon them. A man should have the same range of color and style in his suits as his female companion. There is no reason why shirts, shoes, and hats should be so standardized. There can be greatly more interest in men's clothing with the type of seasonal changes in style and color that women's styles enjoy. At present a minor change in the styling of a man's suit once a decade constitutes a revolution. Certainly higher and more colorful styling in men's clothing will result in larger wardrobes, and greater turnover in men's wardrobes. This must bring an expanding and flourishing men's clothing and furnishing industry. Textile consumption will be increased, employment and retail sales will be stimulated, and our drab and dirty city streets and offices will take on a lighter, happier, more colorful air.

If this attempt is made, we shall not only conform to what appears to be a basic law of nature, but shall also greatly increase the number of garments manufactured and yardage of textiles consumed.

New Minimum Standards of Quality for Sheets, Pillowcases

BUYING organizations and retailers can now be assured that the sheets and pillowcases they order will meet minimum standards of quality, according to the American Standards Association. National Standards to be known as American Standard Specifications for Bleached Cotton Bed Sheets and Pillowcases have just been made available following approval by a majority of manufacturer, retailer, and consumer interest groups under the procedures of the Association, and have been developed under the sponsorship of the American Hospital Association. To be sure that they receive sheets that meet these minimum standards of quality, buyers can specify on their purchase orders that sheets and pollowcases shall meet or exceed the American Standards for the various types. They can get this information through to their customers by asking manufacturers to attach specification labels to the sheets and pillowcases.

These standards define important quality factors for five types of sheets. They establish minimum breaking strengths for both warp and filling, indicating relative strength and durability of the fabrics; the maximum percent of sizing which may be added to the fabrics of the different types; the weight by ounces per square yard, indicating the relative amount of cotton in the fabrics; the number of stitches per inch in the seams and hems. Methods of test and tolerances also are defined. The five types are named according to the combined thread count of warp and filling and the kind of yarn used.

THE new American Standards for sheets and pillowcases were arrived at through the regular process of the American Standards Association by which all the parties at interest—makers, distributors, and users—arrive at substantial agreement. The procedure, though voluntary, is not simple. The development of the sheet standards has had a long history. They were requested 21 years ago by the American Home Economics Association. The steps they went through during that 21 years have been described by Carol Willis Moffett, who represents the American Home Economics Association on the committee responsible for the work. Mrs. Moffett says, "At that time, 45 persons representing 59 organizations of manufacturers, distributors, and consumers met in conference to consider whether the project was feasible. They agreed without a dissenting voice that it was.

"A smaller committee was selected, representing all interests, which was to determine the characteristics of sheets which should be defined, how they were to be defined, how they were to be tested, and how they were to be stated in the standard. Research work was done and within a relatively short time, standards had been formulated.

"Then they ran into stormy going. Because sheet standards were the first to be undertaken in the consumer goods field through the American Standards Association, fears arose about their effect on competition. These fears, which seem merely quaint now, were very real then. They began to diminish when some manufacturers used specification labels, some of them very much like the standard definitions of sheeting qualities which now have been accepted. These specification labels were the fruit of the cooperation of manufacturers, retailers and consumers on the sheet standards because each interest got a chance to understand the others' viewpoints better.

"But for years repeated efforts failed to bring the standards through to general approval by all groups. To Robert A. Seidel, chairman of the Consumer Goods Committee of the American Standards Association, and chairman of the Executive Committee of the NRDGA, goes the lion's share of credit for breaking the long deadlock. Under his vigorous and skillful leadership, most of the interests involved have agreed to take less or give more than they originally wanted to include in the standards. The final compromise inevitably does not represent the most perfect and complete definition for sheets and pillowcases which might be written. But it does represent voluntary agreement on defining important characteristics."

ONE of the points that consumers hope will be included in any future revision of this standard is specifications for shrinkage, Mrs. Moffett declares.

It is expected by many of the group that helped to bring the standards to completion that these definitions of minimum quality will help retailers and manufacturers who promote brand names. They explain that such minimum requirements represent solid ground as a basis for statements concerning quality. Additional values above the minimum requirements bring distinction to branded merchandise and add conviction to advertising claims, thus manufacturers and retailers are relieved of unfair price competition from products falling below minimum standards.

Using standards as a basis for specifying type and quality, store buyers and buying organizations enjoy the same advantages industrial and governmental purchasing agents have. These large scale buyers regularly base procurement on specifications. This information can be made available to home buyers if retailers ask manufacturers to attach labels to their product showing American Standard specifications for the type of sheet and pillowcase.

The American Standard Specifications for Bleached Cotton Bed Sheets and Pillowcases, L4.1-1948, are available from the American Standards Association, 70 E. 45 St., New York.

Czechoslovak Industries Fair

A "Let's Do Business" fair, showing Czechoslovakian industrial products available for export to the United States in 1949 and indicating the products desired for import from this country, opened under the auspices of the Central Federation of Czechoslovakian Industries at the Museum of Science and Industry in Rockefeller Center on Tuesday, January 12th, and will continue through January 30th.

Textiles and textile products receive a large share of the 16,000 square feet of floor space devoted to the exhibit. Textile products accounted for almost half of the $20,000,000 of exports from Czechoslovakia to this country in 1948, it was pointed out.

Among the textile products shown at the fair are fine handkerchiefs of Czechoslovak flax and of finest cotton; fabrics for women's apparel, men's shirts and pajamas, and home furnishings; bed and table linen, silk piece goods, traditional fine lace products, carpets, hats, hosiery, and knitwear.

The exhibits, designed primarily as a demonstration to American merchandisers and manufacturers of the products and materials supplies available, are displayed to indicate as well how much consumer appeal the various items have for the general public.

Representatives of various Czechoslovakian industries, including the textile trades, are on hand to provide detailed information about products which arouse interest. At the same time, the Czechoslovak industry representatives are seeking information about products available for import to their country, particularly in raw materials.

THE historic Czechoslovak textile industries, dating back to early Middle Ages when the Kingdom of Bohemia included vast segments of Germany, Poland, Austria, and other present Central European nations, have always been dependent upon imports of cotton, wool, silk, flax, hemp and synthetic fibres.

The artificial fibres industry, largely devoted to viscose rayon before the war, now boasts four major plants in production. Post-war products of the industry include perlon, a nylon-like fibre used in the glove and hosiery industries; slovlna, a cellulose fibre with characteristics similar to wool: "vistra"; and prosvit, a cellulose cellophane.

Goods to be displayed have been arriving for several weeks, both by ship and by plane.

The variety of these products covers the gamut of modern industry. Included with the hundreds of textile articles are glasware, costume jewelry, ceramics, rubber and leather goods, toys, furniture, musical instruments, microscopes, cameras, shoes, rugs, automobiles, candy, liquors, canned foods, paper goods, plastics, hunting guns, bicycles, telephone switchboards and medical instruments. Many novelties in the craftswork and applied arts categories are exhibited. Sporting goods, pumps, lathes, motors, and the latest in ladies' apparel are given prominent space.

On the industrial side, the purpose of the Czechoslovak Industries Fair is two-fold: to develop and expand the American market for Czech goods and to acquaint American business men with the types of products that Czechoslovakia would like to import from this country.

Fall Woolen Colors

"AFTER-FIVE" Tone-on-Tones, a sophisticated group of muted shadowy shades, contribute high-style interest to the Confidential Advance Woolen Collection for Fall 1949, just issued by The Textile Color Card Association to its members.

These subtle misty colors, it was explained by Margaret Hayden Rorke, managing director of the Association, are shown in six sets of a blending light and medium shade and their names are suggestive of their soft dusty tonality. They comprise *Snowblu* and *Foggy Blue, Cloudy Gold* and *Tobacco Bronze, Twilight Aqua* and *Greendusk, Rose Champagne* and *Terra Cotta Rose, Teagreen* and *Ripe Olive, Winter Pink* and *Old Port*. Although the Association has for some years presented the basic colors in its woolen and rayon cards in the form of tone-on-tones, this harmonious arrangement now takes on special significance, because of the growing style favor for combining shades of the same color range. These new duotones, Mrs. Rorke said, are expected to prove particularly smart for dresses, ensembles and millinery for late afternoon and informal dinner and theatre wear.

Shades of the Woods is the appropriate headline for a collection of eight attractive rustic tones especially adapted to casual town, country and travel clothes, including knitwear. Keyed in the medium scale, these woodland shades comprise *Mauveleaf, Blupine, Woodgrey, Forest Blue, Meadow Moss, Copperbark, Green Balsam* and *Foliage Crimson*.

The basic color range for town wear gives prominence to a collection of twelve medium and dark tone-on-tones captioned *Autumn Harmonies*. Stressed in the neutral classification are the subdued *Sable Taupe* of brownish cast and the lighter blending shade, *Pearl Grege*. Greys, again slated for wide acceptance, are interpreted in two new renditions, *Cinder Grey* and the deeper *Graphite Grey*. Rating high favor in the important beige to brown family are the rich deep tone, *Brown Chocolate*, and the sandy *Nutria Beige*. All of these distinctive neutrals, Mrs. Rorke pointed out, blend most effectively with smart fur shades. Also registering strongly for the coming fall are the appealing new *Amandine Green*, and the darker *Spinach Green*, aptly described by their names. *Bacchante Red*, a spirited cardinal version, and the deeper Burgundy tone, *Maroon Wine*, add warmth and sparkle to the winter colorscope. Expressing the high style preference for unusual off-shades in the lavender to plum scale are the greyed *Ashmauve* and *Wild Blackberry*, a dark blackish purple.

Radiating all the zest and animation of the sports, resort and cruise scene are eight vivid tropical hues featured as *Colors Under the Sun*. Highlighted in this bright fashion orbit are *Sea Turquoise, Indies Copper, Rico Green, Tropic Magenta, Haiti Red, Rio Sapphire, Burnt Gold* and *Solar Purple*. The forty new colors described above will all be incorporated in the Regular Edition of the Association's 1949 Fall Woolen Card to be issued later.

New Services, Projects, Businesses

DANRAY FABRICS CORP.—has been formed to replace Dan-Ray Fabrics Co., and is now in operation at its offices at 1450 Broadway. Samuel Lent is president and Dan Schacter secretary-treasurer. The move is said to be part of an expansion program of the firm, which handles a line of staple rayon cloths.

MONROE TEXTILES, INC. — has been formed to operate the cotton yarn plant established by the Bloom Mills interests in the former Camp Sutton area, it is learned. Approximately 10,000 spindles will be placed in operation within the next month, it is said, and plans include enlargement of the mill to about 15,000 spindles at a later date. Emanual Stotter of Bloom Mills, Inc., New York, is listed as one of the incorporators of the new company, which is authorized $250,000 capital stock.

AN INVESTMENT OF ABOUT $3,000,000—to expand facilities for the production of polyvinyl alcohols at the Niagara Falls, N. Y., plant has been authorized by E. I. duPont de Nemours & Company.

TO PRESENT THE CHEMICAL MARKETS FIELD — to technically trained students in the metropolitan New York area, the Polytechnic Institute of Brooklyn and the Chemical Markets Research Association will sponsor a joint all day meeting at the Hotel Biltmore, February 10, it was announced by Dr. H. S. Rogers, president of Polytechnic. Through the cooperation between the Institute and the Association, the meeting will provide an opportunity for students with chemistry and chemical engineering educations to find out about the rapidly developing outlets in this new division of the chemical industries. According to Dr. Rogers, chemical markets research is one of the fields where there is a growing recognition of the need for trained men.

AMERICAN VISCOSE CORPORATION—has confirmed reports that the vinyl resin plastic used in the new "carved" broadloom announced recently by the Firth Carpet Company is its Vinyon HH resin staple. The Vinyon staple is credited with giving the carpeting an embossed or hand-carved effect which is both more permanent and more pronounced than previous methods. It was emphasized that the Vinyon staple is not cheaper than the wool with which it is blended. Rather it is more expensive. The net result, however, is a fine quality carpeting at a lower price than has been possible heretofore in comparable floor coverings. It will retail at around $11 and $12 a square yard. The new high-style carpeting, called Cellini, because the patterns were taken from designs created by the sixteenth century sculptor, was introduced to the trade at the Carpet Opening in Chicago January 3 and at the New York carpet show the week of January 17.

HUNTER FABRICS, INC.—a new converting firm, has been formed as a division of Ripley Fabrics Corp., to cater exclusively to retail yard goods departments, mail order houses and the export trade. The firm will distribute prime fabrics woven by Stonecutter and other mills. Jules J. Levin, who recently resigned from Forge Mills, Inc., has been named sales manager. Officers of the new firm are: Leon Paleg, president; Irving Hirsch, treasurer; Lawrence Paleg, secretary. Headquarters are at 469 Seventh Avenue.

AVONDALE MILLS, using national magazines with combined circulation of more than 13 million, will launch an extensive new advertising program in February, according to Edward Russell, Jr., advertising manager. The advertising will be directed to buyers of both piece goods and ready-to-wear garments. The first of a series of full-page, four-color advertisements built around the theme, "Companion Colors," will appear in the February Ladies' Home Journal and in subsequent issues of Vogue, McCall's, Today's Woman, Modern Miss, Good Housekeeping, Vogue Pattern Book, Butterick Pattern Book and McCall's Pattern Book. The idea, "Companion Colors," is developed from the fact that Avondale's dyed-in-the-yarn colors can be matched in patterns of stripes and solid shades.

FOTO-FAB—the revolutionary new process of photographic reproduction on textiles, is now geared for volume production, A. M. Perlman, president of A. M. Perlman, Inc., the rayon converting firm that owns Foto-Fab, has announced. Foto-Fab, which prints by means of light passing through a negative onto sensitized cloth, is said to retain all the half-tones of photography, with a third dimensional quality and fineness of detail that cannot be obtained by any other method of printing on textiles. Color fast, sun proof, wash-proof, it is as strong as the fabric on which it is printed and may be used on rayon, cotton, linen, silk, and other textured materials.

The process opens up a new field of unlimited scope for the designer of wearing apparel, draperies, home furnishings, table linens—said to be almost any field in which textiles are used, Mr. Perlman says.

More flexible operation than either roller or screen printing, Foto-Fab can achieve results that are impossible with these or other methods. Motifs may be small repeats in continuous yardage or heriocally scaled up to 20 feet without repetition of the motif.

Used extensively for camouflage materials during the war, Foto-Fab passed the required "weathering" test of 200 hours continuous exposure to accelerated sunlight and washing. It also meets and surpasses the standard requirements of the U. S. Testing Corporation for the best commercial printed fabrics, according to the company.

Personnel

EMMETT J. DRISCOLL—above, who has joined U. S. Finishing Co. to represent it in the New York market for allover coverage with emphasis on rayons. He recently resigned from Turner-Halsey Co. after four years on the executive staff and as department head. Prior to that he had been with Sayles Finishing Plants 22 years, of which 20 had been in the New York market. He resigned from the Navy in 1922 to join that company. During the recent war he served on the joint Army-War Production Board Nylon Advisory Committee for the finishing industry. He is chairman of the National Corporate Membership Committee of the A.A.T.C.C. as well as past chairman and councilor of the New York Section of the association. He was a member of the Editorial Advisory Board of the *Textile Colorist and Converter* prior to its incorporation into the *American Dyestuff Reporter.*

DR. GEORGE E. LINTON, dean of the Textile Department of the Fashion Institute, has been elected president of the American Association of Textile Technologists, succeeding EPHRAIM FREEDMAN, director of Macy's Bureau of Standards, who was elected to serve on the board of governors of the association for three years. FRED W. NOECHEL of Botany Mills, Inc., was elected first vice-president, and STEPHEN S. MARKS of *Daily News Record* was named second vice-president. BERNICE S. BRONNER of the Textile Resin Department of American Cyanamid Co., was re-elected secretary and OLEN F. MARKS of Industrial Rayon Corp., was renamed treasurer. In addition to Mr. Freedman, governors elected to serve on the board for three years are: RICHARD T. KROPF of Belding-Heminway-Corticelli, and ERB N. DITTON of Gotham Hosiery Co., Inc. Present governors, who will continue to serve for two years are: C. W. BENDIGO of *Textile World;* GEORGE H. HOTTE of A. M. Tenney Associates, and JULIUS B. GOLDBERG of J. P. Stevens & Co., Inc. Governors who will continue to serve for one year are: CARL I. TABER of Nylon Division, E. I. du Pont de Nemours & Co.; SEVERN A. MILLER of Wellington Sears Co., Inc.; WALTER E. SCHOLER of American Viscose Corp. Those retiring from the board are: LEWIS M. CARPENTER of Brandy Mills Corp.; JOSEPH E. HIRSCH of Cyril Johnson Woolen Co., and JOHN J. GOLDSMITH of Hess Goldsmith & Co., Inc. Elected to serve as auditors for the year are: LARUS R. BURGESS of Kanmak Textiles, Inc.; MARIE ANTOINETTE FALCONE of Associated Merchandising Corp., and BERNARD GUTMAN of Crompton-Richmond Co., Inc.

JOHN F. GREENE—formerly general superintendent at Bates Manufacturing Co., has joined Wamsutta Mills, New Bedford, Mass., in an "executive capacity," it has been made known.

HORACE G. CLEVELAND—has been elected a vice-president of Robert F. Branch Advertising Agency. Mr. Cleveland, formerly vice-president of J. M. Mathes, Inc., and at one time advertising manager of Cheney Brothers, is widely known in the textile apparel and decorating fields. In addition to his other duties he will be in charge of new business development for the Branch Agency.

E. L. SCRUGGS—has been elected a vice-president of the Springs Cotton Mills at a special meeting of the board in Lancaster, S. C.

JOSEPH R. NAYLOR, JR.—has been named assistant manager of dress goods for Dan River Mills, Inc., and will work under R. H. Lennox. Mr. Naylor has been with the firm since February 1946, and was formerly with his father, who owns the John S. Naylor Dry Goods Co. in Wheeling, W. Va.

STANLEY H. GALE AND DONALD E. KNAPP—have been appointed to new posts at Deering, Milliken & Co., Inc., as head of the sportswear division of the woolen sales office, and head of the dress division of the woolen sales office, respectively. Mr. Gale will direct the sale of worsted, woolen and wool and rayon blended fabrics to sportswear markets and Mr. Knapp their sale to the dress trade in all markets. Mr. Gale has been with the company since 1940 and Mr. Knapp since 1944.

VALENTINE W. GOTTSCHLING has become associated with J. P. Stevens & Co., Inc., in an executive capacity and will head a special woolen department for development of fabrics for the men's, boys' and outerwear trades. Previously he was for 15 years vice-president in charge of sales for Hayward Schuster Co., Inc.

THE APEX CHEMICAL CO., INC. tendered a dinner to 50 of its key employees recently at the Hotel New Yorker, to celebrate the 90th birthday of its founder and Treasurer, HUGO HELBURN, and also to dedicate the completion of a new addition to its manufacturing facilities at a cost of about $100,000. The Company, through its President, Herman Rothstein, took occasion to announce a bonus of three weeks salary to all its employees, with a wage increase effective January 1st. Mr. Helburn was presented with an automobile.

BRIGADIER GENERAL L. O. GRICE—Commanding the New York Quartermaster Purchasing Office, has announced that JAMES A. MATTHEWS, Memphis cotton merchant, has been employed in connection with the procurement of raw cotton and to act as technical advisor to the Commanding General and his staff. At the same time, he announced that JOHN C. LEE, member of the firm of Scattery and Jones, New York, has been designated by the Cotton Shippers Association to represent the industry and assist the government in an advisory capacity on this and any future cotton procurements.

General Grice stated that the New York Quartermaster Purchasing Office has received procurement directives to effect purchases of approximately 38,000 bales of raw cotton for shipment to Korea to be used in the civilian rehabilitation program. In response to a request from the cotton industry, he added, the basis of quality originally specified on the Invitation to Bid has been broadened to include various other qualities.

Mr. Matthews, well-known in the cotton trade, was formerly associated for more than seven years with the Mid-South Cotton Growers Association, Memphis, a cotton cooperative market. Previously he was with the Cotton Cooperative Associations of Memphis and New Orleans.

M. GORDON GAY, merchandise supervisor of Pacific Mills, has accepted the Manhattan group chairmanship of the textiles and mills solicitation committee for The Salvation Army 1949 Appeal, which opened on January 15th and will run through February 15th. This committee's quota in Manhattan has been set at $30,000. Assisting Mr. Gay in canvassing the field of textiles and mills throughout Manhattan will be Earl Wheaton and Don O'Hara, salesmen from Cannon Mills who will serve as co-chairmen of the cotton goods division; William T. Bryan, president, William T. Bryan & Company, who heads the handkerchief division; Stewart C. Carse, president, York Street Flax Spinning Company, Inc., chairman of the linen division; J. P. T. Armstrong, president and director, Belding Heminway Company, silks and rayons division chairman; Charles Hendler, partner, Milbank Leaman & Company, chairman of the woolens and worsteds division; and Samuel Harris, president, H. Harris, who heads the custom and merchant tailors.

WILLIAM J. ERWIN—became vice-president and director of Riegel Textile Corporation and general manager of the Company's Ware Shoals, S. C. division, effective January 17, succeeding W. C. Summersby, who was recently named a vice-president of Springs Cotton Mills. Formerly vice-president of J. P. Stevens, & Co., Inc., and executive officer of its Republic Division at Great Falls, S. C., Mr. Erwin joined Republic in 1929 as assistant to George Wright, then its president. Prior to 1929, Mr. Erwin was with Consolidated Textiles, first at Lynchburg, Va. and later at Shelby, N. C.

FRED T. SMALL—vice-president of Celanese Corp. of America, has been elected a member of the board of the Corporation. He will shortly be promoted from manager of the Cumberland, Md., yarn producing plant to executive duties in the New York office and will have responsibility for the physical condition of all operating plants here and abroad. Mr. Small joined Celanese 25 years ago at Cumberland, was named chief engineer in 1926 and plant manager in 1940. In 1945 he was named a vice-president.

PAUL E. STOCKER, textile technologist in the fabric development section of the Acetate Division of E. I. du Pont de Nemours & Co., has resigned, as of January 15. With du Pont for the past 12 years, Mr. Stocker was formerly with Onondaga Silk Mills and Duplan Corp. He has also taught at Penn State College and has been connected in a teaching capacity with the New York program of vocational adult education in textiles. His plans will be made known at a latter date.

HARRY MATLINS has joined Carousel Fabrics as co-owner and vice-president, it has been made known. He will cover the men's and boys' wear trades. Mr. Matlins was formerly for 15 years with Cadillac Textiles, Inc. DANIEL GREEN, who is one of the founders of Carousel, is the other owner.

HERBERT MARCUS, JR.—secretary of Neiman-Marcus Company, Dallas specialty store, became Managing Director of the Neiman-Marcus Man's Shop and L. A. Wallace, who has headed the men's merchandising division since it was instituted, has been made an Assistant Vice President, according to an announcement made recently.

FRED SCHWARTZ—has been appointed assistant sales manager of Fabric Prints, Inc., it has been announced by Ben Leerer, president and sales manager. Mr. Schwartz was formerly associated with Philtex Fabrics Corp., print specialists, and with Crest Fabrics. At the same time Mr. Leerer announced that JULIE LEVINE has joined the sales staff of the company and will call on the local manufacturing trades. Mr. Levine formerly was with Cohn-Hall-Marx and Seymour Mann, Inc.

WILLIAM E. KLEES—has been appointed to the sales staff of Southeastern Cottons, Inc., 58 Worth Street. He was formerly sales manager of Texcharm Fabrics, Inc., New York. Mr. Klees has been in the textile business for many years and is well acquainted with the trade. In his new position with Southeastern Cottons, he will be calling on manufacturers in New York City.

HARRY B. SCHWARTZ — wartime knitwear buyer for the Quartermaster Corps, has resumed his former position with the New York Quartermaster Purchasing Office, and will again handle the procurement of knitgoods, including hosiery, underwear and outerwear. He joined the Philadelphia Quartermaster Depot in 1942 and moved to New York in 1945, when the New York Quartermaster Purchasing Office was established. In April, 1946 he was awarded the Army Commendation for Meritorious Civilian Service.

JAMES O. CLAYTON—research associate of the California Research Corporation, has been appointed chairman of the Pacific Chemical Exposition, scheduled for November 1-5, 1949, at the San Francisco Civic Auditorium, according to Dr. Richard Wistar, chairman of the California Section of the American Chemical Society. Dr. Wistar was appointed to the Exposition committee to assist Mr. Clayton: Donald W. Baldra, Shering Corporation; Lloyd F. Brooke, California Research Corporation; Dorr H. Etzler, California Research Corporation; Leo R. Gardner, California Spray Chemical Corporation; Hans Lineweaver, Western Regional Research Laboratory; Miss Valerie Phillips, San Francisco College for Women; L. W. Van Doren, Oronite Chemical Company; and Worden Waring, Shell Development Company.

These are New...

A NEW PROCESS for making a fabric ribbon superior in sheen to even pure silk satin has just been announced by Freydberg Bros.- Strauss ribbon manufacturers. Known as Texray, the ribbon is made by laminating a rayon warp to an acetate film. This eliminates the woof, yet gives substantially the same appearance as a woven fabric, but with added luster as the plus factor. Exceptionally smooth and lustrous, the ribbon is now being manufactured in widths ranging from 3/16" to 4" and will be sold, with the other ribbons manufactured by the company, under the Beau Tye label. The process makes possible perfect precision in design in all patterns, without the slightest deviation it is claimed. It is also possible to print Texray in a large variety of patterns for many purposes. Another interesting feature of the ribbon is that, although crisp in appearance, it is actually very soft in texture. Texray also has great tensile strength and ties easily, according to the company.

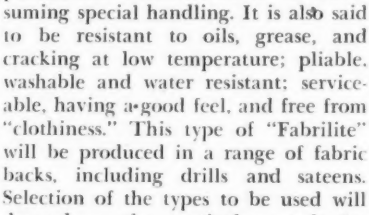
Special machinery, developed for the new manufacturing method, will turn out large quantities of ribbon in the coming year, with a full production schedule already under way.

A NEW TYPE OF PLASTIC UPHOLSTERY was introduced by the Du Pont Company at the winter exposition of the American Furniture Mart, opening January 3 in Chicago. This new "Fabrilite" supported vinyl plastic sheeting is the feature of the Du Pont exhibit.

Since the introduction of synthetic resins in the field of upholstery, the Fabrics Division of the Du Pont Company has been using them to produce both a plastic coated fabric and an unsupported sheeting. These have been marketed under the "Fabrilite" trademark.

Now new engineering techniques developed in the Du Pont plants and laboratories at Newburgh, N. Y., and Fairfield, Conn., have resulted in a new kind of plastic upholstery, having the better features of both of the other types. This is the new supported plastic sheeting.

According to Ernest J. Braun, director of sales of the Fabrics Division, the new upholstery is a quality article with eye-appeal and at the same time easy to work in furniture manufacture. It is made with the smooth, slick finish which is now so popular in plastic upholstery, and can be sewed, tacked, padded and formed without time-consuming special handling. It is also said to be resistant to oils, grease, and cracking at low temperature; pliable, washable and water resistant; serviceable, having a good feel, and free from "clothiness." This type of "Fabrilite" will be produced in a range of fabric backs, including drills and sateens. Selection of the types to be used will depend on the particular needs for each upholstery application.



THE FIBRE GLASS SUPER-HEATER—pictured above, is said by the manufacturers to be the only unit able to produce the high-temperature uniform heat essential for successful industrial processing. Using electric filaments closely woven in fibre glass to give absolute heat uniformity, the heat is radiated evenly over every square inch of heating surface, in degrees up to 700° F. The units are claimed to be efficiently handling the pre-heating of plastics and plastic sheets, the dehydrating of processed textiles, paper asbestos and other materials, the drying of all types of coatings, laminations and saturations, and the drying and curing of lacquers, inks and plastics. Heating panels are used horizontally, either face up or face down, using radiant, conducted or convected heat. They are also used vertically to heat materials from one or both sides. When used in series, they can be set to operate at one temperature, or temperatures on each unit may be varied to supply staggered increases or decreases along the production line. Air circulation is increased by the addition of blower units blowing the air through the units where air must be circulated or where moist air or noxious fumes must be driven off. The SUPER-HEATERS are custom built in various lengths and widths to fit processing requirements. Special units for temperatures in excess of 700° F. are built to specifications. They are manufactured by the Industrial Radiant Heat Corporation, Gladstone, N. J. Selling agent is the Sill Paper Company, Engineering Division, 51 Madison Avenue, New York.

Among firms now using the SUPER-HEATER are Alexander Smith, Bigelow Sanford, duPont, Atlas Powder, Firestone, Hodgman Rubber, Reynolds Metals, Ritchie Fabrics, Rohm & Haas, U. S. Rubber.

"THE DECORATIVE ARTS OF SWEDEN"—by Iona Plath, is the title of a new book in English published by Charles Scribners Sons. Of 246 pages and more than 500 illustrations, it has 32 pages in full color and is priced at $10.00. The *New York Post* said of it: "Sweden has a new ambassador to the United States. The handsome volume covers the textiles, ceramics, metal, glass, wood and wall paintings. . . . Students, designers, or any person with a drop of Swedish blood will find the book a delight." In the *New York Herald Tribune*, Hudson Strode calls the book "illuminating" and "one of the handsomest books of the year."

THE TALENTS OF CONTEMPORARY ARTISTS FROM FIVE COUNTRIES have been employed by F. Schumacher & Co., New York., to create new fabric print designs to decorate homes in the United States this year, according to the company.

The new designs, numbering nearly a score, by an international group of artists, keynote the 1949 decorative fabric prints introduced Jan. 3 by Schumacher. Assembled by Rene Carillo, the collection represents outstanding artists from the United States, France, Sweden, Denmark and Italy.

TRADE NOTES • NEW PRODUCTS

• To Expand Production of Polyvinyl Alcohols

Authorization of an investment of about $3,000,000 to expand facilities for the production of polyvinyl alcohols at the Niagara Falls, N. Y., plant was announced recently by E. I. du Pont de Nemours & Company.

Polyvinyl alcohols, solid alcohols in powder form, are versatile synthetic resins for a great variety of industrial applications. By varying conditions of manufacture, a series of polyvinyl alcohols, each with different physical properties, can be made.

Major industrial uses include: adhesives and binders, textile sizing, paper sizing and coating, molded products and film, stencil screens, ceramics, temporary protective coatings, and emulsifying and thickening agents. In their principal applications the polyvinyl alcohols compete with starch, casein, glue and gelatin.

It is anticipated that the work will be completed in about two years.

• Philadelphia Manager for Calco

J. Pfister, Manager, Dyestuff Department, American Cyanamid Company, Calco Chemical Division, announces the appointment of James Dixon as Manager of the Dyestuff Department of the company's Philadelphia branch.

Mr. Dixon was born in Leeds, England, and came to this country in 1899, obtaining his early education in Providence and Boston. He entered the woolen and worsted industry in 1905 as an apprentice and was tutored in fabric structures and textile design. As part of his training, Mr. Dixon attended different textile schools.

Mr. Dixon came to Calco in 1920 and in 1921 opened Calco's first Philadelphia office covering the Pennsylvania, New Jersey, Ohio and Maryland territory.

Mr. Dixon's office is located in the Terminal Warehouse Building, 401 North Broad St., Philadelphia, Pa.

• Dr. Powers Transferred by Monsanto

Monsanto Chemical Company announced recently the transfer of Dr. Donald H. Powers from the company's Merrimac Division textile department in Boston to the General Development Department in St. Louis.

• Standard Brands Appointment

W. Douglas Smith, above, has been appointed Southern Representative for the Diastafor Department, Special Products Division of Standard Brands Inc.

Mr. Smith will handle the company's line of Diastafor desizing agents and he is well prepared to serve the Textile Industry by technical training and practical experience. He received his B.S. in chemistry from Tulane University. In addition to 3 years of teaching at Tulane he has also had 18 years' experience in dyeing and finishing and in selling dyestuffs and engineering equipment to textile manufacturers.

Dr. Powers, who has been instrumental in developing chemical specialties for textiles, brings to the Development Department a wide background of experience, not only in textiles, but in other fields such as rubber chemicals and surface coatings. He joined Monsanto May 1, 1945, as director of sales development for the textile chemical department and will assume his new responsibilities on February 1st.

• Research Director, General Aniline

Dr. J. H. Bruun has been appointed Director of the Central Research Laboratory of General Aniline & Film Corporation, Dr. Cary R. Wagner, Vice-President in Charge of Operations, announced recently.

Dr. Bruun will have charge not only of the work at General Aniline's Central Research Laboratory in Easton, Pa., but will also direct the research activities in the various divisional laboratories of the company, including those at Grasselli, N. J., Binghamton, N. Y., Rensselaer, N. Y., and Johnson City, N. Y.

Dr. Bruun joined General Aniline in 1942 as Director of Process Development. Prior to that time, he was Manager of the Norwood Research Division of Sun Oil Company and before that he was a member, of the National Bureau of Standards technical staff.

A Norwegian by birth, Dr. Bruun attended the Norwegian Institute of Technology at Trondheim, Norway; Nobel Institute in Stockholm, Sweden, and obtained his Ph.D. at Johns Hopkins University in 1929.

• Du Pont Dye Prices Announced

E. I. du Pont de Nemours and Company has announced dye prices for 1949 contracts. The new prices represent a maximum increase of eight per cent on some products but the prices of a number of major dyes remain unchanged.

The weighted average increase of Du Pont dye prices is now approximately 33 per cent above 1939 levels, with some major items selling at 1939 prices.

• Resigns from American Aniline

According to a recent announcement made at the company's executive office in New York, L. B. Finke has resigned as Purchasing Agent of American Aniline Products, Inc.

• Polyco 337

A textile finish which is said to require no curing, yet which will last through a number of launderings or dry cleanings is being manufactured by American Polymer Corporation of Peabody, Mass., under the name Polyco 337. It is claimed that this new stiffener may replace starch in the finishing of cotton and rayon textiles.

Currently sold only to manufacturers of textile finishes, Polyco 337 comes as a water-thin material containing 35% resin solids. It is stated that: it requires no high temperature curing because the evaporation of the water content fully sets the polymerized resin; no solvents are used in its manufacture; it absorbs no chlorine on bleaching; its non-inflammable and non-toxic qualities recommend it for use under about any conditions. It is compatible with starches, dextrines, gums and

other conventional textile sizing agents and its application requires no special operations or special machines.

Besides laundry-resistant stiffening, Polyco 337 is also said to provide extra resistance to soiling, abrasion and wear, increased fabric strength and no discoloration on exposure to light or embrittlement on aging. It is claimed that users of Polyco 337 will experience no difficulties in calendering and can drying operations and the ultimate consumer is assured of additional ease and smoothness in ironing fabrics so treated.

Technical Data Sheet P-12 with complete details is available on request.

• New Calco Technical Bulletin

A paper, "Scientific Study of Rayon Dyeing," presented by Dr. G. L. Royer before the Canadian Association of Textile Colorists and Chemists at Montreal, Canada, has been published as a Calco Technical Bulletin.

The purpose of this paper is to review some of the work done in the Calco laboratories on the study of rayon dyeing.

A copy of Calco Technical Bulletin No. 806 may be obtained by writing the Advertising Manager, Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J.

• Charlotte Office, Monsanto

Monsanto Chemical Company's textile chemical department has opened a district office in Charlotte, N. C., to serve the South's expanding textile industry, the company has announced.

Monsanto's new textile office will be located at 410 Johnston Building. Francis K. Burr and Robert Gow, textile chemical sales representatives, have been assigned to the new office.

The Charlotte district includes West Virginia, Virginia, North Carolina and South Carolina.

At the same time, the company announced plans for leasing additional warehouse space in the Charlotte area to store textile chemicals for Southern and Southwestern mills.

• duPont Grants to Universities

The Du Pont Company announced recently that it is instituting a program of grants-in-aid to ten universities for the 1949-50 academic year for unrestricted use in the field of fundamental chemical research. The program, which at the start will be on a trial basis, has the aim of raising the amount of such research being done in this country above present levels, with a view to "stock-piling basic knowledge."

In announcing the new program, Crawford H. Greenwalt, President of the Du Pont Company, said that these grants-in-aid are designed to help insure the flow of fundamental knowledge in science upon which the future industrial development of our country and the standard of living of the American people are so dependent.

The ten universities to which grants-in-aid of $10,000 each are being offered are California Institute of Technology, Cornell University, Harvard University, Massachusetts Institute of Technology, Ohio State University, Princeton University, Yale University, University of Illinois, University of Minnesota, and University of Wisconsin.

The grants are being awarded for the academic year of 1949-50, but it is the company's hope, should the program work out satisfactorily, to continue each of them for a period of five years. The universities themselves will select the research projects in which the grants will be employed, the only stipulation being that they be free from any commercial implications at the time the work is initiated.

• Manager, New York Office, Dow Chemical

The Dow Chemical Company has announced the appointment of Leo B. Grant as Manager of its New York sales office succeeding Ralph E. Dorland, who held that position from 1919 until his death last Ma[illegible].

Mr. Grant was associated with Dow's magnesium division in Midland, Michigan, for 20 years before joining the executive staff of its New York office about a year ago.

• General Releases

General Dyestuff Corporation, 435 Hudson Street, New York 14, N. Y., announces release of circulars describing the following products:

Fast Orange Salt GCS—(Patented)—the diazotized and stabilized salt of Fast Orange GC Base. It is soluble in water and couples directly with Naphtolates to form insoluble Naphtol colors. It yields principally bright orange shades with most Naphtols. On grounds prepared with Naphtol AS-SG, a maroon shade is obtained and with Naphtol AS-LB, a khaki shade. The most useful combinations are said to possess good to very good fastness to washing, fairly good to excellent fastness to light, fairly good to very good fastness to chlorine and fair to very good fastness to hot pressing. It is sufficiently soluble to be applicable in all types of dyeing equipment. When printed on Naphtol AS prepare it produces bright orange shades said to possess good fastness to light and washing and fairly good fastness to chloride. Such shades are further said to be fast to overprinting with caustic soda for the production of imitation seersucker effects. Fast Orange Salt GCS possesses good solubility and stability in the print paste. Circular G-552.

Supramine Yellow 3GLA-CF* — (Patented)—a level dyeing acid dyestuff which produces bright greenish shades of yellow which are said to be fast to light and fairly fast to washing. In addition, it is said to be very fast to hot pressing, stoving, decatizing and carbonizing. The fastness to salt water is fairly good. Either as a straight yellow or in combination with other Supramine, Alizarine and Anthralan dyestuffs, superior results are said to be obtained in the dyeing of carpet and knitting yarns, hosiery, upholstery materials, dress goods and hats. As its solubility is very good, it can be applied in all types of dyeing equipment. Effect threads of cotton, rayon or acetate rayon are left unstained. Dyeings are dischargeable to a white. Since the affinity from a neutral bath is fairly good, it can be employed in union dyeing. It is non-dusting and sufficiently free from copper and manganese to be suitable for the dyeing of material to be rubberized. Circular G-555.

Rapid Fast Red RH Powder—(Patented)—an azoic compound soluble in caustic soda which, after printing and aging, develops in the form of a bright red pigment said to possess good fastness properties. It is stated that it dissolves readily with caustic soda, is stable in the print paste and couples rapidly during aging. Coupling takes place either in acid fumes or in neutral aging if it is to be applied with vat colors. It is twice as strong tinctorially as Rapid Fast Red RH Paste New but otherwise the shade, fastness and printing properties are the same. Circular G-556.

Acid Anthracene Red GA Extra Conc. CF—a neutral dyeing acid dyestuff which produces bright scartlet red shades with all the characteristics of a milling color. It is said to have fairly good fastness to light and good fastness to washing, fulling, water, crocking, carbonizing, decatizing and pressing. It may be used as a self shade or in combination with other milling colors for the dyeing of loose wool, slubbing and yarn and also for Vigoreaux printing. The product is applied from a weakly acid bath or by the top chrome method and also for shading chrome dyeings. Afterchromed, the wet fastness properties are slightly improved. The affinity from a neutral bath is said to be very good and it is, therefore, well suited for

union dyeing. Circular G-557.

Diamond Blue Black EBS Extra CF—a mordant dyestuff suitable for application to wool by the top chrome and chrome mordant methods. This new brand has been much improved in solubility and its usefulness for the production of navy blues and blue blacks has been greatly increased. It yields shades said to possess very good fastness properties at a low cost. Circular G-558.

Katigen Cutch Brown RN Conc. CF*—a sulfur dyestuff which produces yellowish shades of brown said to possess fairly good light fastness and good wash fastness. It is applied to cotton and rayon yarn, raw stock or piece goods in practically all types of equipment. The solubility makes it especially suitable for application in package dyeing. It is non-dusting and sufficiently free from copper and manganese to be suitable for dyeing material which is to be rubberized. Circular G-565.

* Reg. U.S. Pat. Off.

• Sodium Chloroacetate

The Hooker Electrochemical Company, Niagara Falls, N. Y., is in pilot plant production of sodium chloroacetate ($Cl.CH_2.COONa$). Technical Data Sheet No. 375 has been prepared and is available on this compound.

This new product is a white non-hygroscopic powder. It is said to dissolve completely and rapidly in water. It may be used in the preparation of various acetates and glycolates. Generally speaking, it may be used in place of monochloroacetic acid. The sodium salt is said to have many advantages over the acid particularly with respect to storage and handling. In chemical processing, its use is said to eliminate the usual neutralization step required for the acid.

The data sheet provides physical data and a list of typical chemical reactions.

• Industrial Process Representatives

Industrial Process Engineers, 5204 Hudson Avenue, West New York, New Jersey, manufacturers of "Standard-Plus" processing equipment, mixers, agitators and agitator drives, have appointed the following new sales representatives:

For Cincinnati territory, Plant Equipment Company, 946 Betts Street, Cincinnati 14, Ohio. They will cover Cincinnati, south western portion of Ohio, southern part of Indiana, eastern half of Kentucky, eastern part of Tennessee and southern section of West Virginia.

For the Pittsburgh and Cleveland districts, John B. Moorehead of John B. Moorehead Co., 335 Fifth Avenue, Pittsburgh 25, Pa. Their territory includes western Pennsylvania, eastern part of Ohio, northern portions of West Virginia and western Maryland.

Industrial Process Engineers, in addition to their "Standard-Plus" processing equipment, designs, builds and installs special equipment, complete processing plants and synthetic resin plants.

• Sales of Synthetic Organic Chemicals

In 1946 the sales value of synthetic organic chemicals and their raw materials produced in the United States remained steady at more than 2 billion dollars, according to a final report just released by the United States Tariff Commission. In 1946 production (35.4 billion pounds) and sales (24.6 billion pounds) were somewhat less than in 1945. Synthetic rubbers, plastics materials, and medicinals were the most important groups of synthetic organic chemicals produced in 1946. Reports covering preliminary statistics for 1946 and 1947 were issued previously.

This is the thirtieth annual report on the domestic synthetic organic chemical industry issued by the Commission. It gives final statistics on production and sales in 1946 for all synthetic organic chemicals and lists the names of the chemicals produced on a commercial scale during that year and the manufacturers of each.

Copies of the report, *Synthetic Organic Chemicals, United States Production and Sales, 1946* (Report No. 159, Second Series), may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 45 cents each.

• DCAT Committees

Robert B. Magnus, Chairman of the Drug, Chemical and Allied Trades Section, New York Board of Trade, announced that he has appointed the following chairmen to head committees for the 23rd Annual DCAT Dinner, to be held March 10, 1949, at the Waldorf-Astoria: Lloyd I. Volckening (The Ivers Lee Co.), *Dinner Arrangements Committee;* Fred J. Stock (Chas. Pfizer & Co.), *Program Committee;* Harold C. Green (L. Sonneborn Sons, Inc.), *Publicity Committee,* assisted by Chas. M. Macauley (Prophy-lac-tic Brush Co.) as Vice Chairman; J. P. Remensnyder (Heyden Chemical Corp.), *Reception Committee,* assisted by Clark L. Rodgers (Owens-Illinois Glass Co.) as Vice Chairman; Carle M. Bigelow (Calco Chemical Div., American Cyanamid Co.), *Honor Guest Committee,* assisted by Harold M. Altshul (Ketchum & Co.), as Vice Chairman.

• Joins Cleaning and Dyeing Institute

The newest addition to the research staff of the National Institute of Cleaning and Dyeing is Dr. William A. Endriss.

In 1930 Dr. Endriss joined the Celanese Corporation as an analytical and control chemist. From 1932-1940 he was with the research and development department of the Philadelphia Quartermaster Depot. For the next two years he was control manager of the Gelatin Products Division of the R. P. Scherer Corporation, Detroit, Michigan. From 1942-1946 Dr. Endriss was with C. E. Jamieson and Company as a formulation development chemist. In 1946 he was also on the faculty of the Department of Chemistry and Dyeing of the Philadelphia Textile Institute. For the last two years he has been section head in the research department, laundry and textile division of the Wyandotte Chemical Corporation.

Dr. Endriss is a member of Phi Psi textile fraternity, the American Chemical Society, the American Pharmaceutical Association, the Michigan Academy of Pharmacy, and the American Association of Textile Chemists and Colorists.

Dr. Endriss has joined N.I.C.D.'s growing staff to carry on rug cleaning research and to establish a curriculum for the contemplated rug cleaning short cause.

• Measurement of Odors

Abstract of a paper presented by Dr. Louis C. Barail at the Scientific Section, The Proprietary Association of America, New York, December 8, 1948.

The author describes three types of Osmometers he devised for the measurement of odors.

The principle of the apparatus is the elimination of variables such as humidity, impurities, parasitic odors, and the control of the air flow and pressure of the air circulating in the apparatus. This enabled the user of the Osmometer to obtain accurate and reproducible results which are expressed in odor threshold numbers, which represent the smallest amount of odors that can be detected with the apparatus.

The single Osmometer is used in the measurement of odors emanating from solids and liquids.

One model is built for use in the laboratory and is connected with a source of compressed air. Another model is enclosed in a portable case and can be connected to any fixed supply of air, or to a portable bottle of compressed air.

The twin Osmometer is specially built for the measurement of odors in gaseous form, such as fumes or highly diluted odors.

The precision of odor measurements with the Osmometer by experienced personnel is such that if trained technicians are switched during one odor measurement, their findings do not show more than 4 or 5% difference.

The Osmometer is currently used to measure the efficiency of air deodorants of the spray type or the wick type, and all body deodorants.

Recently textile manufacturers have used various chemicals to treat fabrics, such as underwear, stockings, mattress tickings and others to render them perspiration-odor-proof, or urine-odor-proof. Mattress tickings so treated did not retain any odor due to perspiration, urine, or decomposed blood on hospital beds.

For quite some time, the perfume and cosmetic industry has been using the Osmometer for the measurement of the intensity of scents, to run comparative tests on the fresh products and after a certain period of aging, and also to compare the intensity of odor of their products with competitive brands.

Finally, the Osmometer has been used in many other fields of the Drug and Allied Industries to detect and measure fumes, stale and foreign odors, and to verify the protection given to drugs and cosmetics by various types of packaging materials.

This apparatus appears as a very useful piece of equipment which has rendered, and will further render, most valuable services to manufacturers and users of drugs, chemicals and cosmetics.

• Norwegian Sales Agency for Boconize

It was announced recently by J. K. Thomas, President of the Alnav Trading Corporation, export Division of the Bocon Chemical Corporation, that they have established an agency for the sale of Boconize, the durable mothproofing chemical, in Oslo, Norway, with the firm of Fredrik Thrane.

The Alnav Trading Corporation presently includes among their representatives for the distribution of Boconize those appointed in Italy and Melbourne, Australia, Transco SRL and Robert Bryce Company, Limited, respectively. At present their policy does not include plans for licensing for the manufacture of Boconize outside of this country.

• Booklet on Detergency

Foster D. Snell, Inc., Consulting Chemists and Engineers, announce a new publication, "Surface Activity and Detergency," available on request. This booklet covers new services offered due to recent developments in the field of surface chemistry.

• Laboratory Equipment Bulletin

The new Beckman Model "B" glass prism Spectrophotometer is described in the December issue, No. 105, of *Laboratory Equipment Bulletin* the four page bimonthly publication of Will Corporation, Rochester, N. Y., suppliers of laboratory apparatus and chemicals.

The bulletin introduces a new Will laboratory safety feature—a beaker holder, for large size beakers, constructed of stainless steel frame with asbestos padded handles.

Other new laboratory apparatus illustrated are the "TiTray" Titration Illuminator, the Lindberg Hot Plate, Model H-5, and the Ohaus Triple Beam Balance in stainless steel.

Copies of Bulletin No. 105 are available from Will Corporation, Dept. ADR-1 Rochester 3, New York.

• Pacific Chemical Exposition

"The date for the second Pacific Chemical Exposition by the California Section of the American Chemical Society for 1949 has been set for November 1 through 5 at the San Francisco Civic Auditorium," says Marcus W. Hinson, manager.

The floor plan for the '49 Show is scheduled to be in the hands of former exhibitors on the morning of January 3, 1949. "These former exhibitors will have about two weeks in which to select their space before it is thrown open to others," says Mr. Hinson.

"As in 1947, the Pacific Industrial Conference will run concurrently with the Pacific Chemical Exposition. These one- and two-day conferences of the twelve cooperating national and local societies and associations provided one of the most outstanding overall conference programs ever given in the West," says Mr. Hinson, and it is expected that an even finer program will be assembled for the 1949 Conference.

OBITUARY

JOHN L. FOULKE

JOHN L. FOULKE, Chief Research Chemist of A. & M. Karagheusian, Inc., died suddenly on December 24th at the age of 48.

Mr. Foulke joined the company in 1942. Previously he was head chemist at the C. H. Masland Carpet Company. Prior to that he was associated with E. I. Du Pont of Wilmington, Delaware.

Mr. Foulke was a graduate of Pennsylvania State College and the Philadelphia Textile Institute and had also done graduate work at the University of Pennsylvania. He was a member of the American Association of Textile Chemists and Colorists; the American Society for Testing Materials; the Philadelphia Businessmen's Art Club, and was on the Technical Committee of the Carpet Institute, Inc.

He is survived by a sister.

CHARLES A. MACE

CHARLES AUSTIN MACE, Secretary of the Synthetic Organic Chemical Manufacturers Association of the United States from 1927 to 1948, died suddenly on January 3rd at his residence on Seton Avenue in the Bronx, N. Y.

Charles A Mace

Mr. Mace was born in 1880 in Boston and was graduated from the Massachusetts Institute of Technology in 1902. Upon graduation he joined the Dominion Textiles, Ltd., Canada, as chemist and left here to go with Armour & Co., Chicago, where he served as a chemist in their by-products division from 1903 to 1907. Until 1916 he acted as a technical demonstrator and salesman for the Badische Company and for the next six years was with the Butterworth, Judson Corp. of Philadelphia. He then became sales manager of the Tower Manufacturing Company in which position he remained until 1927 when he joined the SOCMA as secretary. He remained in this position until he was just recently named consultant to the association.

Mr. Mace was a member of the Drysalters Club of New England, the University Club in Washington, D. C., the Chemists' Club of New York, and the Elks. He also served a term as president of the Wool Club in New York.

Due to his long-time association in the textile and chemical field, Mr. Mace had a long list of friends and acquaintances who will mourn his passing. Funeral services were held on January 6th at the Burr Davis Chapel in Mount Vernon, New York.

Mr. Mace is survived by his wife and two daughters.

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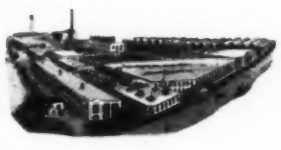

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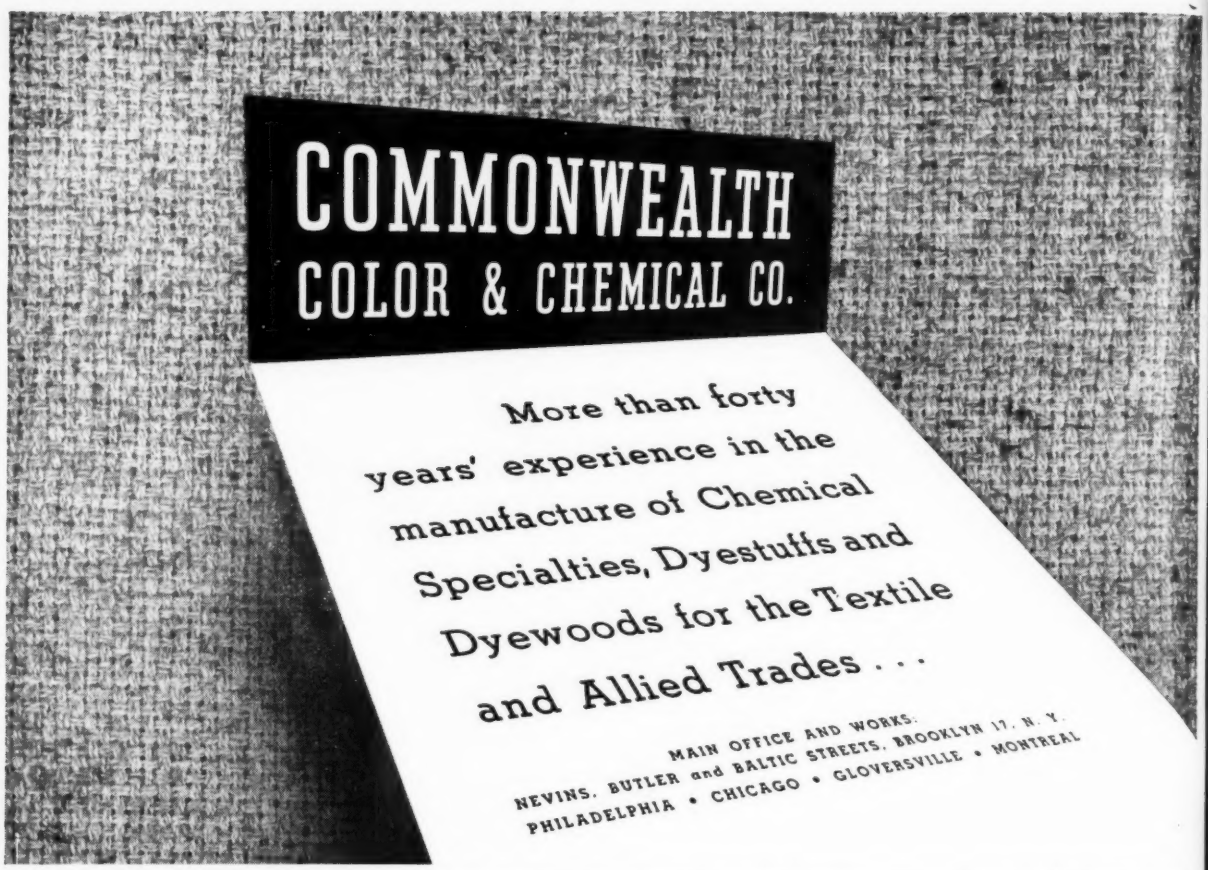
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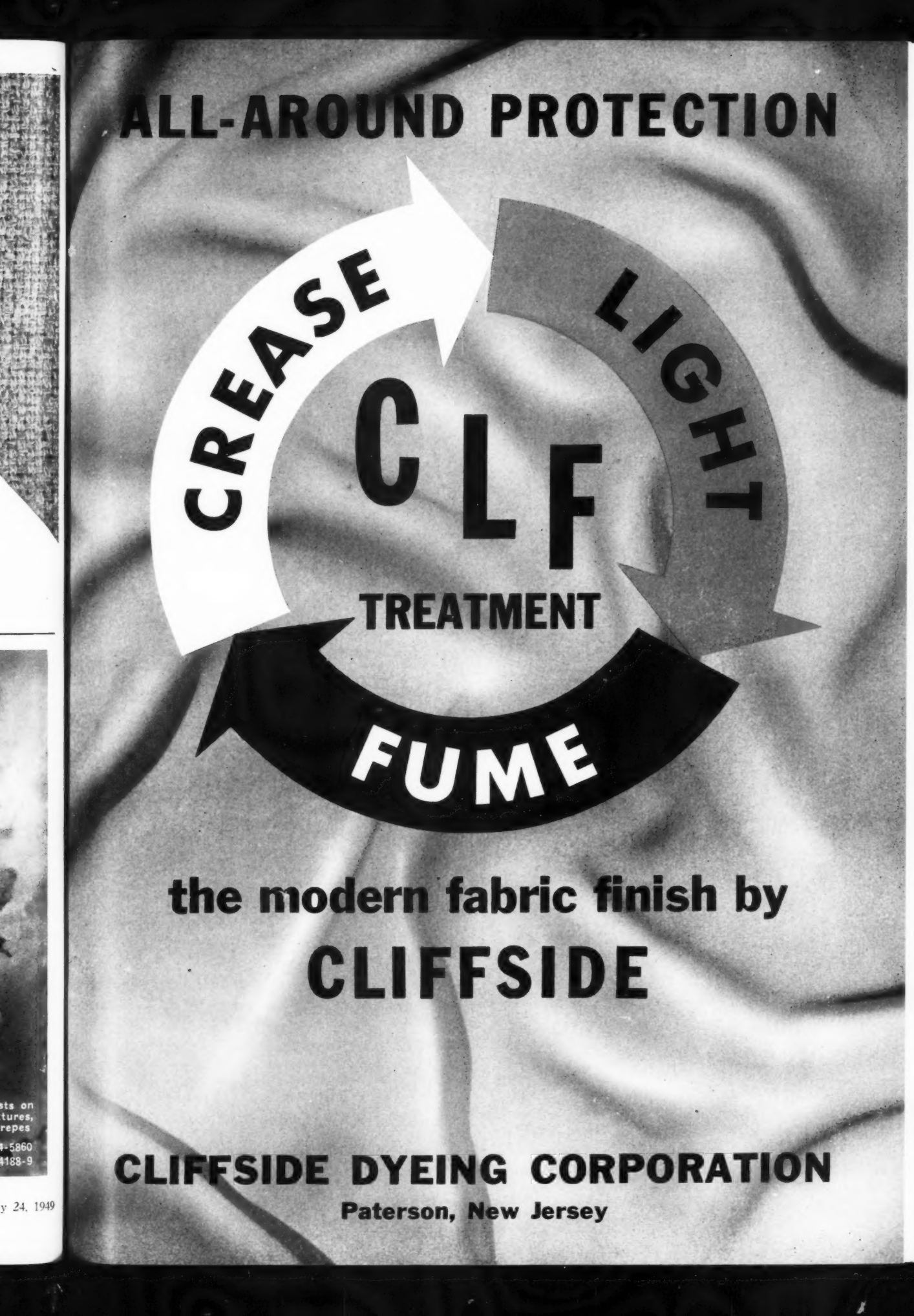
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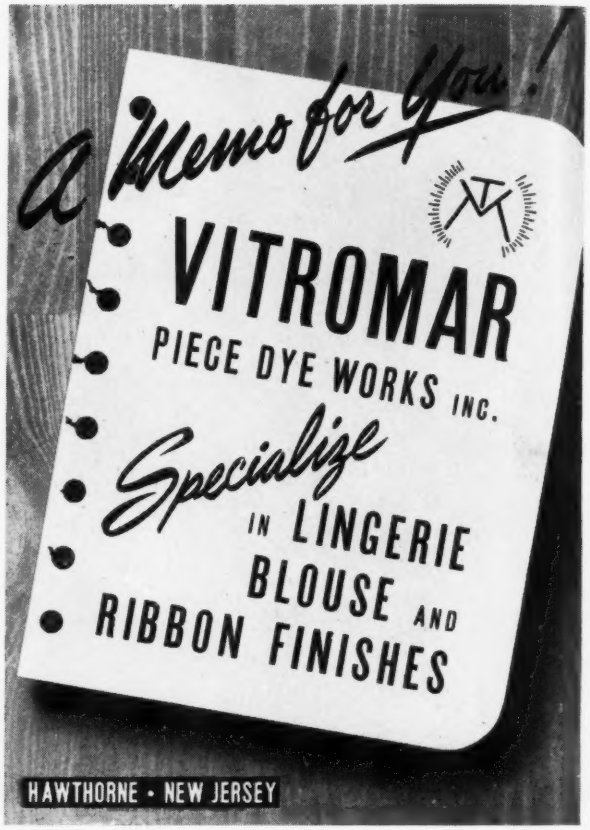

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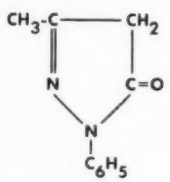

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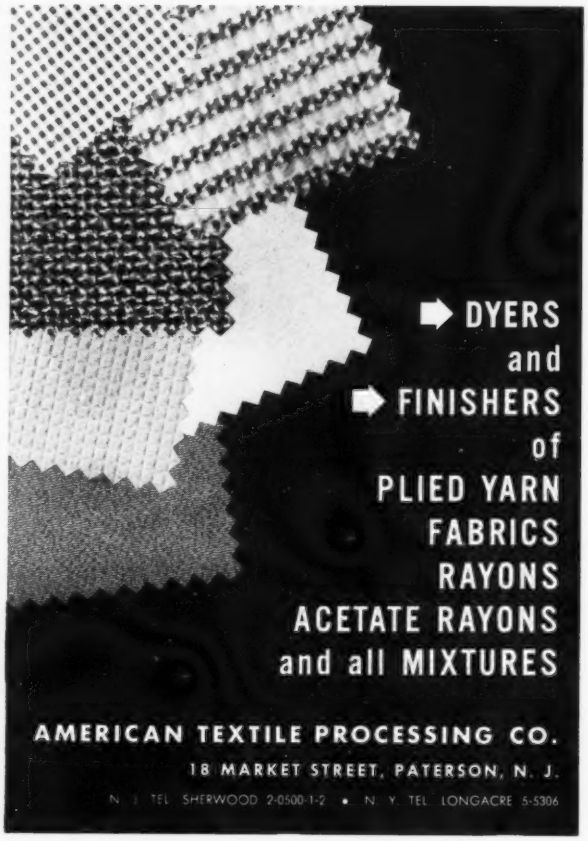

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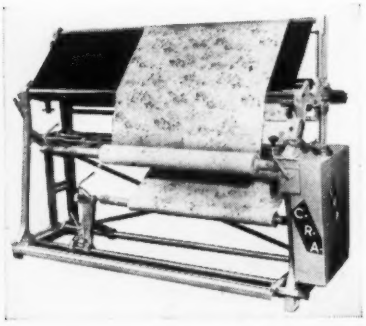

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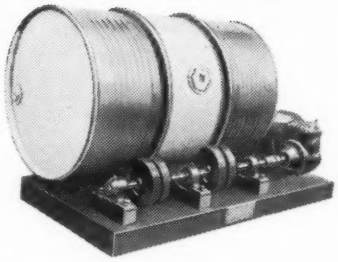

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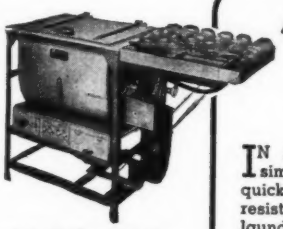

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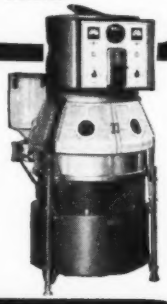

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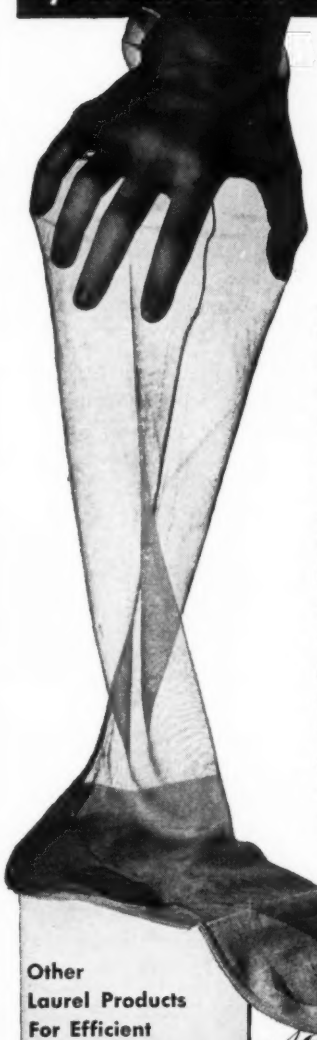

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POSITION WANTED: Chemist, 20 years experience in chemical control of piece goods dye houses handling synthetic fibers and mixtures with knowledge of application of dyestuffs, auxiliaries, resin, finishes and quality and cost-control, seeking position, preferable N. Y. C. metropolitan area.

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POSITION WANTED: TEXTILE RESEARCH CHEMIST, 9 years director; experienced research, development, quality control and control laboratory desires responsible position in laboratory or production. Write Box No. 560.

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WANTED: Chemist-Textile laboratory experience, group leader type-surface active agents. Ph.D. preferred. Good future. Write complete details to Box No. 566.

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POSITION WANTED: Eastern seaboard preferred, textile chemist 3½ years Lowell Textile Institute, several years experience dye testing, evaluation of dyestuffs, physical testing, raw stock dyeing, woolen or worsted mill. Write Box No. 573.

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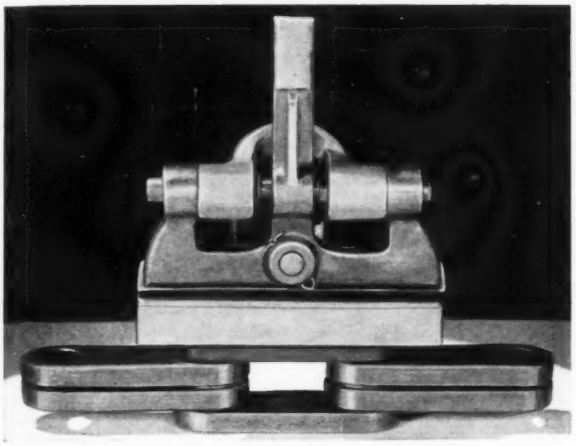

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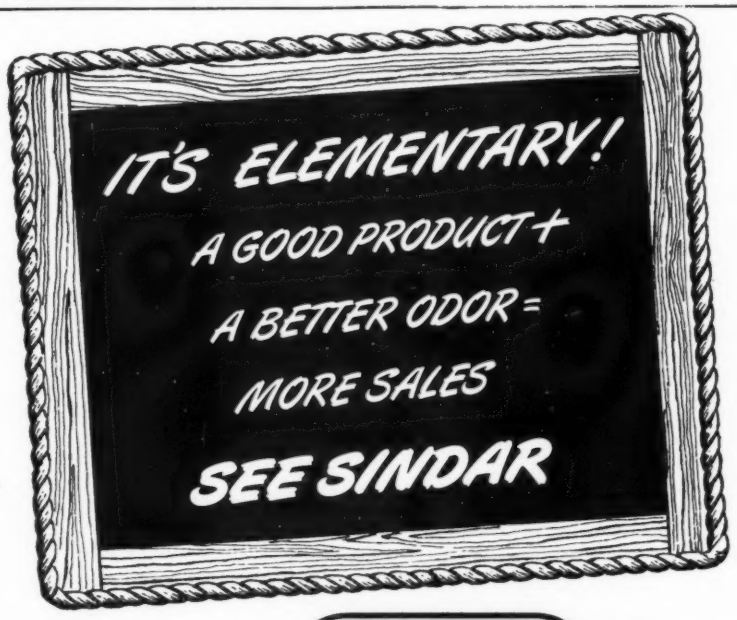

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DURING 1949

the

American Dyestuff Reporter will publish

FOUR SPECIAL ISSUES

MARCH 7th → TEXTILE WET PROCESSING EXPOSITION, which will be held in the 71st Regiment Armory, 34th Street, corner of Park Avenue, New York City, MARCH 21, 22, 23, 24, and 25, 1949.

APRIL 18th → KNITTING ARTS EXHIBITION to be held in Atlantic City, New Jersey, APRIL 25th through 29th, 1949.

OCTOBER 3rd → A.A.T.C.C. CONVENTION NUMBER, covering the Annual Meeting and Convention to be held in Atlantic City, New Jersey, OCTOBER 13th to 15th, 1949.

DECEMBER 12th → ANNUAL PROCESSING REVIEW NUMBER. This issue as usual, will feature all new dyestuffs, chemicals, processing equipment, etc., developed during 1949.

Advertisers desiring to use these special issues should make space reservations now.

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